

9th International IFS and Contemporary Mathematics and Engineering Conference



July 08-11, 2023
Tarsus, Mersin, TURKEY



IFS²COM-E 2023

Abstract Book

EDITOR-IN-CHIEF

Assoc. Prof. Dr. Gökhan Çuvalcıoğlu
Mersin University, TURKEY

EDITORS

Assis. Prof. Dr. Buğra Sarper
Tarsus University, TURKEY

Dr. Feride Tuğrul
Kahramanmaraş Sütçü İmam University, TURKEY

EDITING TEAM

Dr. Arif Bal
Mersin University, TURKEY

Ms.D. Şeyda Sezgek
Mersin University, TURKEY

Cansu Altıncı
Mersin University, TURKEY

ISBN: 978-605-68670-9-5

PREFACE

Dear Conference Participants,

Welcome to the Ninth International Conference on IFS and Contemporary Mathematics and Engineering (**IFSCOM-E 2023**). The aim of our conference is to bring together important engineers and mathematician researchers from all over the world with different engineering and mathematical interests. This conference is one of the leading international conferences to present new and fundamental advances in different fields of Engineering and Mathematics and to highlight interdisciplinary studies. We want to provide a suitable environment where researchers can exchange ideas, discuss the latest research findings and collaborate to generate new different ideas. We are happy to have outstanding researchers in different fields such as Mathematics and other fields related to Engineering sciences.

It is also the aim of the conference that young researchers and graduate students engage in such exceptional event. Their inputs and participation in such event should encourage them to do more research activities in the future.

We would like to thank all participating scientists who made the most important contribution to this conference. Their contributions are the key ingredient to the success of the conference.

We are sincerely grateful to all participants who really value our work and efforts that we develop every year to improve this conference. We are so proud to reach this respected level of success. Indeed, this was not possible without the outstanding work, efforts and supports from the members of the conference team: Scientific Committee Members, Referee Committee Members and Local Organizing Committee Members.

We are very pleased to present the abstracts of the Ninth International Conference on IFS and Contemporary Mathematics and Engineering (**IFSCOM-E 2023**). The conference was completed with **167** participants and **174** papers. The distribution of research papers delivered by the participants are classified by the following fields: Applied Mathematics, Algebra, Geometry, Topology, Analysis, Statistics and other fields such as Financial Mathematics, Fuzzy Sets, Game Theory, Geometric Computer Aided Design, Graph Theory, Intuitionistic Fuzzy, Machine Learning and Mathematical Modeling, Mechanical Engineering, Food Engineering, Information Visualization, Visualization Literacy, Environmental Engineering, Measurement of Fluid Properties, Civil Engineering, Natural Disaster, Industrial Engineering.

Seven invited speakers attended the conference to share information about current studies in different fields with our participants. We have 167 participants participated from 21 countries: Canada, Mexico, India, Morocco, Poland, Russia, Turkey, etc..

This abstract booklet contains the titles and abstracts of all presented talks during the conference. Many submitted articles to this conference are considered in the following listed journals and books:

Journals:

- Journal of Universal Mathematics (JUM)
- Kahramanmaraş Sutcu Imam University Journal of Engineering Sciences
- Karamanoğlu Mehmetbey University Journal of Engineering and Natural Sciences
- Notes on Intuitionistic Fuzzy Sets (Notes on IFS)

Books:

- IFSCOM-E 2023 Abstract Book with an ISBN number
- IFSCOM-E 2023 Proceeding Book with an ISBN number
- SPRINGER Book

We wish that all participants participate in all sessions, ask questions and be active in the conference. We also wish that this conference is a great place where you meet new friends, gain some knowledge, and get yourself involved in some research collaborations.

CHAIRMAN

Assoc. Prof. Gökhan ÇUVALCIOĞLU

July 2023

HONONARY CHAIRMAN

Orhan Aydın (Rector)(TR)

CHAIRMAN

Gökhan Çavalcıoğlu (TR)

KEYNOTE SPEAKERS

İbrahim Dinçer (TR)

Oscar Castillo (MX)

INVITED SPEAKERS

Hanlar Reşidoğlu (TR)

Md. Hasanuzzaman (MY)

Poonam K. Sharma (IN)

Madhumangal Pal (IN)

SCIENTIFIC COMMITTEE MATH

Bijan Dawaz (IR)
Carlos M. da Fonseca (KW)
Ekrem Kadrođlu (TR)
Evadokia Sotirova (BG)
Hamza Menken (TR)
Hüseyin Yıldırım (TR)
Janusz Knapczyk (PL)
Krassimir Atanasov (BG)
Latif Hamid (KW)
Luis Aime Fono (CM)
Madhumangal Pal (IN)
Mehmet Çiftil (TR)
Mohamed Elomari (MA)
Mireca Andelic (KW)
Murat Güzeltepe (TR)
Kyriakos Papadopoulos (KW)
Oscar Castillo (MX)
Panagiotis Chountas (UK)
Piotr Nowak (PL)
Paramajit Kumar (IN)
Said Melliani (MA)
Sotir Sotirov (BG)
Şükran Konca (TR)
Taekyun Kim (KR)
Vassia Atanassova (BG)
Sinem Tarsuslu (Yılmaz) (TR)
Maya Altınok (TR)
Serap Şahinkaya (TR)
Halil Anaç (TR)

SCIENTIFIC COMMITTEE ENG

Aris Theofilatos (GR)
Ahmet Önen (OM)
Ahmet Kaya (TR)
Ahmet Alper Yontar (TR)
Alaattin Kaçal (TR)
Ali Kokangül (TR)

Ali Özen (TR)
Ali Şenol (TR)
Ata Hanlar (TR)
Aysel Özfidan (TR)
Berdan Özkurt (TR)
Buğra Sarper (TR)
Daver Ali (TR)
Deniz Üstün (TR)
Dilum Dissanayake (CY)
Dimitris Potoglou (UK)
Durmuş Yarımpaşa (TR)
Emel Yoncalı (TR)
Eren Özçöyün (TR)
Erica Douzel (PT)
Erman Harputlu (TR)
Fida Ragimov (AZ)
Fahri Geyik (TR)
Fahri Duran (TR)
Fahri Fındık (TR)
Ferruh Turan (TR)
Funda Kahraman (TR)
Gerhard Wilhelm Weber (PL)
Hüseyin Polat (TR)
Hüseyin Topaklı (TR)
Hüseyin Ünal (TR)
İbrahim Dinçer (CA)
Indrasis Chakraborty (CA)
İrem Ersöz Kaya (TR)
İsmet Çelik (TR)
Kadri Süleyman Yiğit (TR)
Kamil Neyfel Çerçi (TR)
Kasım Ocakoğlu (TR)
Lin Li (CN)
Mahmoud Jourabian (IR)
Mine İnce Ocakoğlu (TR)
Mehmet Tahir Erdiñç (TR)
Mehmet Eker (TR)
Mehmet Fatih Yılmaz (TR)
Metin Mutlu Aydın (TR)
Mustafa Berkan Biçer (TR)
Mustafa Egemen Taner (TR)
Mustara Kemal Külekci (TR)
Münir Süner (TR)

Olegas Prentkovskis (LT)
Onur Derse (TR)
Osman Murat Özkendir (TR)
Ömer Faruk Bay (TR)
Pawan Kumar (DE)
Raif Bayır (TR)
Ramazan Köse (TR)
Rovshan Aliyev (AZ)
Serhat OBUZ (TR)
Serdar Coşkun (TR)
Serdar Çiçek (TR)
Sezgin Aydın (TR)
Şule Yücelbaş (TR)
Tahir Hamdi oğlu (TR)
Tahir Hikmet Karakoç (TR)
Tamer Çoktaşar (TR)
Victor H. Juenas (US)
Meyser Alcan (TR)
Ming Fan (CN)
Zehra Yıldız (TR)

REFEREE COMMITTEE MATH

Abdullah Alazemi
Krassimir T. Atanassov
Oscar Castillo
Gökhan Çuvalcıođlu
Ekrem Kadıođlu
Mehmet Küçükakan
Said Melliani
Madhumangal Palani
Hanlar Rusıdođlu
Sotir Stanić
Huseyin Yıldırım

REFEREE COMMITTEE ENG

Ercan Köse (TR)
Salih Hakan Yetgin (TR)
Serap Akcan (TR)
Uđur Eşme (TR)
Volkan Ateş (TR)

LOCAL ORGANIZING COMMITTEE

Feride Tuğrul
Arif Bal
Şeyda Sezgek
Cansu Altıncı
Fatma Yamaç Sağdıç
Enise Çiçek Yıldırım
Yasin Koç
Ali Müftüoğulları
Melisa Abayrak

CONTENTS

PREFACE	ii
KEYNOTE SPEAKERS	iv
INVITED SPEAKERS	iv
SCIENTIFIC COMMITTEE	v
REFEREE COMMITTEE	viii
LOCAL ORGANIZING COMMITTEE	ix

Investigating The Time-Domain Sensitivities To Nonlinear Hydrodynamic Interactions Of A Resonant Micro-Cantilever With Glycerol-Water Solutions in Multi-Frequency Operations Cağrı Yılmaz	1
Generators of F/R' Leibniz algebras Zeynep Özkurt	5
The Necessity Of Using Recycled Waste Aggregate in Türkiye Eren Yağmur	6
The Gradient And Partial Derivatives Of Bicomplex Numbers: A Commutative-Quaternion Approach Ali Atasoy	8
A Fuzzy Soft Set-Based Approach To Identify Academic Dishonesty And Misconduct Esra Korkmaz	10
Second Order Model Reduction Of Higher Order Systems And Pid Controller Design Ali Yüce	11
On The Exponential Stability Of Stationary And Perturbed Implicit Systems Nor El-Houda Beghersa, Mehdi Benabdallah, Mohamed Hariri	13
Locally Recoverable Codes Based On The Matrices Derived From The Magic Squares	15

Rabia Zengin, Mehmet Emin K�rođlu	
New Number Sequences Built On Hybrid Numbers Mine Uysal, Engin �zkan	16
Modeling And Analysis Of Capacitated Nonlinear Network Traffic Assignment Problem Hasan Dalman	18
Cyclic Dna Codes Over Finite Alphabets Tulay Yıldırım	19
Solvability And Nash Stability Results Of Fuzzy Nonlinear Abc-Fractional Coupled System Aziz El Ghazouani, Irfan Hamid Elomari And Said Melliani	20
Clique Matching Neighborhood Polynomial of Graphs Madison M. Asuaan, Rosalio G. Artes Jr.	22
Role Of The Weak Allee Phenomena On A Predator-Prey Model Eigen Kangalgil, Seval Iřık	24
On A General Inclusion Theorem Hikmet Seyhan �zarslan And Bađdag�l Kartal	26
On Infra Fuzzy-Soft Topological Spaces Arife Atay	27
On Derivations Of Free Bicommutative Algebras řehmus Findik	29
Generalization of Almost Primary and Nilary Ideals in Noncommutative Rings Alaa Abouhalaka	30
Local Lower Separation Axioms in Q-Reflexive Spaces Samed �zkan	32
Invariant Algebras in Polynomial Rings Nazar řahin �đ�sl�	34
An Action Of Dihedral Group Nazar řahin �đ�sl�	35
An Almost Unbiased Ridge Estimator in Beta Regression Yasin Asar	36
Revolutionizing Matrix Computations: A Practical Approach For Efficient Calculation Of Matrix Sign Function G�l Karaduman	38
Multiplication Rules For Pointwise Inner Automorphisms in Lie Algebras Ela Aydın	39

Exact Solution Of The Schrodinger Equation in The Topologically Massive Space-Time Ali Tarsuslu, Kenan Söğüt	40
An Application Of Controlled Sets in Medical Diagnosis Sinem Tarsuslu (Yılmaz), Gökhan Çuvalcıoğlu	42
On Translation Surfaces Beyhan Yılmaz, Aykut Has	44
Complex Matrix Version Of Hybrid Numbers Çağla Ramis, Yasin Özülkü	46
Approximate Solution Of The Modified Kratzer Potential Plus Screened Coulomb Potential in N-Dimensions Aysel Özülkü	47
On Leap Zagreb Indices Of A Special Graph Obtained By Semigroups Yaşar Nacaroğlu	49
Approach To Intuitionistic Fuzzy Sets With Comparative Examples Of Decision Making Methods in Different Fields Ezgi Tuğrul, Mehmet Çitil, Gökhan Çuvalcıoğlu	50
Approximation Of Max-Product Truncated Baskakov Operators By Fuzzy Numbers Ecem Acar, Sevilay Kırıcı Serenbay	51
Deciding Applicability Of Blockchain In Avionics Systems Ayşenur Sayıl, Harun Çelik	52
On Isolated Subsemigroups Of Order-Decreasing Transformation Semigroups Melek Yağcı	54
A Novel Methodological Framework To Identify The Criteria For Decision-Making Problems in Neutrosophic Fuzzy Environment Ömer Faruk Görçün	55
Solving Nonlinear She Equations Using Harris Hawks Optimization Algorithm Yasin Bektaş	57
Dna Codes From Reversible Group Codes By A Virus Optimisation Algorithm Adrian Korban, Serap Şahinkaya, Deniz Üstün	59
Geodetic Index Of Graphs Glee Ann L. Tampipi, Rosalio G. Artes Jr.	61
Induced Path Polynomials Of The Join And Corona Of Graphs Cerina A. Villarta, Rolito G. Eballe, Rosalio G. Artes Jr.	62
Convex Independent Common Neighborhood Polynomial Of Graphs Amelia L. Arriegasgado, Rosalio G. Artes Jr.	64

Masked And Unmasked Face Recognition On Unconstrained Facial Images Using Hand-Crafted Methods Ali Torbati, Önsen Toygar	66
A Note On Higher Order Pell 2 ⁿ s-IONS Hayrullah Özimamoğlu	68
Some Properties Of Leonardo Fibonacci Hayrullah Özimamoğlu	69
On Modeling on Multiplicative Calculus for Population Growth Yusuf Ziya Altay, Zeliha Bulut, Mustafa Göktaş	70
The Evaluation Of The Criteria To Be Taken into Account When Selecting Online Shopping Sites Based On Industry 4.0 With Using Dematel Method Zeynep Durmaz, Adem Aksakal	72
Connected, Compact, and Sober Objects in ConLim Kübra Çelik, Ayhan Erciyes	74
Finite Element Method For The Nonlocal Elliptic Problem With A Ψ -Kirchhoff-Type Operator Mahamat Saleh Daoussa Haggag; Mohamed Mbheou	75
Statistical Cauchyness With Deferred Cesáro Mean in Asymmetric Context Zeynep Hande Toyganözü	77
Comparison Of Predictors/Estimators in General Linear Models With Stochastic Restrictions Nesrin Güler, Melek Eriş Büyükkaya	78
Approximate Solutions Of The Integro-Partial Fractional Equation Involving Tempered Ψ -Caputo Fractional Derivative Sami Baroudi, M'hamed Elomari, Ali El Mfadel, Abderrazak Kassidi	79
Solvability Of A System Of Third-Order Difference Equations Merve Kara, Şule Devecioğlu	81
Properties Of Generalized Semi Closed Sets in The Topology Havva Taşkıran, Ayhan Erciyes	83
Existence Theorems For Set-Valued Operators in Wc-Banach Algebras Cesim Temel, Müberra Selah	85
Novel Inequalities For Generalized Fractional Integrals Applied To Synchronized Convex Functions Abdullah Akkurt, Hüseyin Yıldırım	86
Totally Umbilical Semi-Invariant Submanifolds Of Poly-Norden Manifolds Şerife Nur Bozdağ	88

On Kconformable Fractional Operators Sümeyye Ermeýdan Çiriş, Hüseyin Yıldırım	89
Sign Language Recognition Mobile Application For Turkish Language Erdem Demirođlu, Furkan Ayakdaş, Asude Tanrıoýurdu, Gülsüm Akkuzu Kaya	91
Quality Classification of Ceramic Sanitaryware Products with Machine Learning Techniques Sedanur Şimşek, Erdener Özcan	93
Best Approximation of Fixed Point Results in Generalized Metric Spaces Nesrin Manav Tatar	95
Some Fixed Point Applications Of F-Modular Metric Nesrin Manav Tatar, Behra Dođan, Duran Turkoglu	97
Open-Loop Control Vs Closed-Loop Control in Smart Irrigation: A Game Theoretical Perspective Ali Hamidođlu	98
Fractional ECFGM (1,1) model with an application Cumügülsüm Erdiñç, Halis Bilgil	100
Fractional Approach To Some Fundamental Concepts Of Surface Aykut Has, Beyhan Yılmaz	101
Fekete-Szegö Problem For Two New Subclasses Of Bi-Univalent Functions Defined By Bernoulli Polynomial Yunus Korkmaz, Ibrahim Aktaş	102
Generalized Kantorovich-Schurer-Type Operators Nursel Çetin	104
Optimization of Gurney flap over NACA 0018 by using Surrogate Modeling Emre Güler, Mehmet Erdem, Şihmehmet Yıldiz, Melike Nikbay	106
Approximation By Bivariate Complex Stancu-Schurer Polynomials in Compact Disks Nesibe Manav Mutlu	108
Approximation By Generalization Of Bernstein-Schurer Operators Nursel Çetin, Nesibe Manav Mutlu	109
Preconditioning Linear Systems Using Kronecker Sum Decomposition Youssef Mezzar	110
Some Numerical Approaches For Computing The Hankel Transform Meryem Güney, Zekeriya Ustaoglu	111
Fren simplicial homotopy to crossed module homotopy Hatice Gülsün Akay	112

A Generalization Of The Linear Positive Operators Preserving The Special Polynomials Kadir Kanat, Melek Sofyaloğlu, Verda Karadaş	114
Computational Aeroacoustic Modeling Of Supersonic Cavity Flows Using Open-Source Flow Solvers Ramazan Kaba, Melike Nikbay, Baha Züner	115
On A One Type Fractional Sturm-Liouville Problem Pınar Türkmen	117
Almost Supra B-Continuous Functions Fatma Talas, Aynur Korkunç, Ayman Alotaibi	118
Using Fuzzy-Logic In Market Conditions For Efficient Portfolio Selection In The Casablanca Stock Exchange Abdelhamid Hammi, Alaoui	120
The Selfadjoint Schrödinger Operator On The Half Line With A Real-Valued Compactly Supported Potential Mehmet Ünüvar	122
On An Eigenproblem Of The Fractional Sturm-Liouville Boundary Value Problem Ayşenep Geçit	123
Compositions Of Permuting N-Derivations With Commutativity For Associative Rings Mehsin Jabel Atteya	124
Positive Toeplitz Operators Between Harmonic Bloch Spaces On The Ball Ömer Faruk Doğan	126
On Some Natural Geometric Differential Operators Razvan M. Tudoran	127
Generalized Symmetric Bi-Derivations Of Up(Bcc)-Algebras Damla Yılmaz	128
A Note On Fuzzy Product Rule Tahir Ceylan	130
Vislit-Test: Designing Effective Visualization Literacy Assessment Test Elif E. Firat	131
A Guideline To Designing Crowdsourced Online Experiments For Evaluating Visualization Literacy Elif E. Firat	133
Mixed Integer Linear Programming Model For Optimizing University Exam Schedules Hamza Abunima, Burhan Pektaş, Nazmiye Kopacak, Özlem Şimşek	135
Decompositions And Inverses Of Some Lower Triangular Matrices Cahit Köme, Kadir Hilal	137

On A New Class Of Hyperbolic Fibonacci Functions And Some Special Polynomials Sure Köme, Yasin Yazlık	138
On Intuitionistic Fuzzy Primary Decomposition Of Intuitionistic Fuzzy Ideals Poonam K. Sharma	139
Applications Of Selection, Determination And Decision Making in Education With The Help Of Fuzzy Logic Ali Sinar, Erhan Çetinkaya, Ali Meryem Çuvalcıoğlu	141
A Maximal Type Of Z-Order Index Büşra Aydın, Nihat Akgüne	142
Examples And Applications Of Decision Making in The Field Of Education Using Intuitionistic Fuzzy Sets Erhan Çetinkaya, Ali Sinar, Ali Meryem Çuvalcıoğlu	143
Brief Qualitative Properties Of The Regularized Prabhakar Fractional System Mustafa Aydın	144
Relative Controllability Of The \mathcal{M} -Caputo Fractional Delayed System With Impulses Mustafa Aydın	146
Some Results On Deferred Cesaro Statistical Convergence Of Order α in The Probability Spaces Uğur Değer, Kübra Uzun	148
The Use Of Unmanned Aerial Vehicles in The 3d Documentation Of Historical And Cultural Heritage: The Case Of Ceyhan Kurtkulagi Caravanseraı Enis Arslan, Ali İhsan Şekertekin	149
A Petrov-Galerkin Method For Solving The Generalized Equal Width Equation Yusuf Tatlısu, Seydi Battal Gazi Karakoc	152
A Compromise Solution To The Multi-Objective Solid Transportation Problem With The Uncertain Parameters Sedanur Aktürk, Nuran Güzel	154
Fractional Prey-Predator Model With Linear Functional Response, Prey Refuge, Fear And Carry-Over Effect Ercan Balcı	155
Subprojectivity Domain of Finitely Generated Modules Arbsie Yasin Shibeshi, Yılmaz Durğun	156
Existence Results for Antiperiodic ψ -Caputo Fractional Differential Equations with p-Laplacian Operator W. Benhadda, M. El-Omari, A. Kassidi, A. El Mfadel	157
A Solution To The Solid Transportation Problem Using Lr Flat Numbers Nuran Budak, Nuran Guzel	159
The Comparison Between Effects Of Heterogeneous And Homogeneous Double Layered Compressible Elastic Media On Dark Solitary Sh Waves	161

Ekin Deliktaş Özdemir	
On Analytical Solutions Of Space-Time Fractional Variant Business Equation With Beta Derivative	163
Nagehan Özdemir, Ayten Özkan	
Spacelike F-Rectifying Curves in Minkowski Space	165
Hülya Gün Bozok, Önder Korkmaz	
An Innovative Approach for Enhancing Traffic Flow: Decentralized Traffic Signal Split Control Method	167
Serap Ergün	
Addressing the Challenge of Traffic Congestion: An Innovative Approach to Optimize Traffic Signal Control for Improved Traffic Flow	169
Serap Ergün	
Robustness Control Circuit for Logic Circuit Integrations with PIC and Arduino Microcontrollers	171
Mehmet Ersin Aytekin, Dönay Kayahan	
A Dynamic Approach To The Effect Of Harvesting	173
Seval Türk, Figen Kangalgil	
Simple Ways For Obtaining Transformation Matrices Of Serial Manipulators	174
Samet Yavuz	
Measurements And Evaluation Of Electric Field Exposure Generated By Modem in Home Environment	175
Mustafa Mutlu	
An Encoding –Decoding Algorithm Based On Narayana Numbers	177
Engin Eser, Bahar Kuloğlu, Engin Özkan	
Applying The Artificial Bee Colony Algorithm: Enhancing The Efficiency Of A Hydrogen-Based Hybrid Renewable Energy System	178
Aykut Fatih Güven	
Interaction Between Ret Protein Kinase And Curcumin And Resveratrol: A Molecular Docking Perspective	180
Deniz Karataş	
A Literature Survey Based On The Tabu Search Heuristic Method For The Solution Of The Multi-Dimensional And Multi-Objective Knapsack Problem And Variations	181
Gürkan Güven Güner	
Numerical Investigation Of The Thermal Performance Of A Liquid Cooled Battery Pack	183
Soner Birinci, Mehmet Sağlam, Bugra Sarper, M. Yusuf Yazıcı, Orhan Aydın	
Corporate Carbon Footprint Calculation And Evaluation Of Mersin University Çiftlikköy Campus	185
Hasret Karakaya, Yasin Özay, Nadir Dizge	
Process Improvement With Value Flow Mapping Method For Low Density Polyethylene Recycling Processes	187
Emre Can Temiz, Emel Yontar	

Investigating Solitary Wave Solutions Of The Benjamin-Ono Equation For Modelling Internal Waves in Deep Water Gülsen Kiliç, Serbay Duran, Birgül Binzet	189
A Review On Latest Developments in Assembly And Temporary Shelters For Natural Disasters İrem Karakaya, Alev Taşkin	190
A New Approach For Score Function In Q-Rung Orthopair Fuzzy Sets Ali Köseoğlu	192
Biofuel Utilization in The Aviation Industry Emine Kahramaner, Özlem Aksoy, Seru	194
Investigation Of Convective Heat Transfer Coefficient Effects On Thermal Energy Storage Performance With Pcm/Graphite Matrix Composite Sare Mitinlik, Mustafa Yusuf Yazici	196
Investigation Of The Effect Of Nanoparticle Additives On The Refractive Index And Density Of Gasoline Nehmet Selman Gökmen, Mehmet Fatih Parlak, Hasan Aydoğan	199
Effect Of Different Build Orientations On Mechanical Properties Of Parts in Additive Manufacturing Technology Derya Karaman And Hüccet Kahramanzade	201
Elimination Of Actuation Singularities Of Kinematically Redundant Rpr-Rpr Planar Parallel Robots Mustafa Özdemir, Muhammed Yasir Çubuk	203
Investigation Of The Capacity Factor Of The Ege Region Wind Power Plants According To The Real Productions İsrafil Karadöl	205
A Hybrid Deep Reinforcement Learning Algorithm Application For Vehicle Routing Problem Meltem Atmuş, Tolunay Göçken	208
On Reliability Analysis Of Reference Intervals in Medicine Gülsen Kiliç	210
Carbon Footprint Calculation And Mitigation Strategies For The Transportation Against Climate Change: Pestel Analysis Şölen Zengin, Fatma Ersoy Duran, Emel Yontar	211
The Effects Of Collector Plate Material On Fiber Fineness in Electrospinning Gonca Şimşek Gündüz	213
Production Of Sucker Rod And Determination Of Its Mechanical Properties And Localization Of This Product Kürşat Kahya, Dergah Uysal, Gökhan Acıyiyen	215
Detection Of Effect Of Smart Robot Automation On Quality And Efficiency in Production Kürşat Kahya, Seren Geçgel, Seda Yücel	217
R58-03 Application in Aluminum Chassis	219

Mustafa Yılmaz, Akin Zengin, Onur Can Kirit, Necir Ahmet Köroğlu	
A Performance Analysis Comparison Of Machine Learning Algorithms In Detection Of Heart Disease Bahar Demirtürk, Bekir Can Telkenaroğlu	220
Automotive Industry Spare Parts Stock Management Fuzzy Analysis Based Ahp Method Application Elife İrem Kal, Emel Yontar	221
Evaluation Of The Effects Of Visual And Somatosensory Inputs On Balance In The Elderly By Using Machine Learning Veysel Alcan	223
The Influence Of The Fermentation Period And The Type Of Modified Milk On The Content Of Essential Amino Acids in Human Milk And Infant Formula Aleksandra Purkiewicz, Kinga Szajkowska, Jacek Nowakowski, Renata Pietrzak-Fiećko	224
Effect of production method on selected bioactive compounds and antioxidant activity of Japanese quince and quince fruit tincture Katalia Marci, Marzena Danowska-Oziewicz, Magdalena Polak-Śliwińska, Agnieszka Narwojsz	226
Determination Of Priority Areas For A Possible Underground Dam Around The Harşit Stream Basin Tuğba Bozkuş, Yusuf Kaya	228
Nonlinear Differential Equations According To The Bishop Parallel Transport Frame Fatma Bulut	230
Numerical Solutions Of Conformable Time-Fractional Klein-Gordon Equation With Proportional Delay By The Novel Method Halil Anaç	232
Faults And Suggestions Detected İn Distribution Panel And Transformers in Power Plants Hale Bakir	233
Evaluation Of Environmental, Social And Economic Performances Of 81 Provinces Of Turkey With Data Envelopment Analysis Gökçen Bayram, Ayşe Hande Erol Bingüler, B. Gültekin Çetiner	234
Microwave Energy-Based Hybrid Nanomaterial Preparation Approach For Energy Storage Purposes Selçuk Poyraz	235
Multi-Objective Optimizations Of Circular And Square Ducts Under Laminar Flow And Constant Wall Temperature Conditions Muhammet Nasif Kuru	237
Comparison Of Reactivity Feedback Coefficients Obtained From Mcnp6.2 And Serpent Monte Carlo Codes Elif Ahsen Baştuğ, Bahram R. Maleki	238

The Effects Of Cylindrical And Partial Pin Fins On The Cooling Performance Of A Minichannel Heat Sink Dondu Nur Turk, Kayhan Dagidir, Bugra Sarper, Cihan Aydın	239
(α, β) -Interval Valued Intuitionistic Fuzzy Strongly α -Group Arif Bal, Gökhan Çuvalcıoğlu	240
Classification of Brain Tumors on MRI Images Using Deep Learning Architectures Samaneh Sarfarazi, Önsen Toygar	242
Active Packaging Films Incorporated With Essential Oils in Nanoemulsion Formulation Natalia Marat, Aleksandra Parkiewicz, Didem Demir, Yasin Özyay, Gulden Goksen	244
Smart Film Production by Including Bioactive Compounds Aleksandra Parkiewicz, Natalia Marat, Didem Demir, Yasin Özyay, Gulden Goksen	246
Pistachio Species Identification Using Histogram Of Oriented Gradient Descriptors And Support Vector Machine Burkan Büyükkaya	248
On Fuzzy Boolean Algebra With Respect To New Fuzzy Logic Conjunction Gökhan Çuvalcıoğlu, Gül Karadeniz Gözeri	250
On The Properties Of The x -norm Corresponding To The Minimum t -Norm Gül Karadeniz Gözeri, Sevilay Demir Sağlam, Gökhan Çuvalcıoğlu	251
Contra Continuity For Λ -Strong B-I-Closed Sets Seyfettin Fidan, Aynur Keskin Kaymakci	252
Investigation Of The Effect Of Types And Particle Sizes Of Reinforcements On Composite Hardness Of Al6061 Alperen Dindar, Merve Tur, Türker Türkoğlu, Sare Çelik	253
Numerical Simulation Of Graphene/N-Ws2/A-Si:H(I)/P-Csi/Ag Hit Solar Cells Nahide Karabulut, Büşra Aydın, Çağlar Duman	255
Theoretical Investigation Of Alternative Fuels Which Can Be Used On Ships Münir Süner, Bugra Sarper, Servet Uzel, Nedim Kizilkaya	257
Approximate Solutions Of Some Fredholm Integral Equations Associated With Lucas Polynomials Çağla Türkoğlu	259
A Performance Analysis Of Attack Individual Pension Funds By A System Dynamics Simulation Approach Muhammed Ordu	260
Structural Analysis Development Study Of The Rear Cover Used in The Trailer Vehicle Onur Can Kırt, Mehmet Vurgun	262
Reducing The Use Of High-Strength Sheet Metal in Timber Carrier Semi-Trailer Vehicles Mehmet Vurgun, Onur Can Kırt	263
Impact Sliding Wear Behaviour Of Thermally Oxidized Ti-6Al-4v Alloy	264

Ayşenur Eğercioglu, Harun Mindivan

Similarity Measure in Bipolar Fuzzy Sets And its Application to Multi-Attribute Decision Making Method
Gözde Sever, Zarife Zararsiz 266

Prediction Of Covid-19 Cases Using Unidirectional Lstm, Bidirectional Lstm, And Deep Neural Network
Applications
Baha Şen, Büşra Demirbaş 268

Ultrasonic Pilot Reactor Design: Temperature, Pressure And Rotary Control Can Be Used in The Production Of
Hygroscopic Materials
Sinan Köse, Fatma Uysal, Samiye Çakan Yetgin 270

Fixed-Point Theorem Via Fuzzy-Interpolative Kannan Type Contraction
Meryem Şenocak 272

Analysis Of Heating And Cooling Degree Day Values For Tra2 Region Provinces
Halil Kaltaçiran 274

Thermal Diffusion-Based Boriding Effect On Hvf-Sprayed Aisi 316l Stainless Steel Coating
E. İzzet Ermiş, Harun Mindivan 276

A New Approach To Gadovan Numbers
Engin Özkan, Engin Eser, Mine Uysal 278

The Comparison of Hydrodynamics Designs of Different Geometries in Restricted and Unrestricted Fluidal
Mediums with Potential Flow and CFD
Munir Suner, S. Aydın Salci, K. Suleyman Yigit 279

Optimizing CO2 Laser Cutting Parameters Of Polyethylene Polymeric Material Using Hybrid Entropy-Topsis
Approach
Oğuzhan Der, Gökhan Başar, Muhammed Ordu 281

Design of Load Lifting Eyebolts and Standardization with Static Tests
Yasin Aygöl 283

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 1-4

INVESTIGATING THE TIME-DOMAIN SENSITIVITIES TO
NONLINEAR HYDRODYNAMIC INTERACTIONS OF A
RESONANT MICRO-CANTILEVER WITH GLYCEROL-WATER
SOLUTIONS IN MULTI-FREQUENCY OPERATIONS

ÇAĞRI YILMAZ

0000-0002-2976-1044

ABSTRACT

In this current work, a forced Van der Pol oscillator based dynamic model is introduced to demonstrate the time-domain sensitivities of the micro-cantilever to the micro-rheological properties of the surrounding fluids. Effects of diverse multi-frequency excitations on hydrodynamically forced displacements are investigated for the glycerol-water solutions with different concentrations. It is demonstrated that the frequency of the displacements under hydrodynamic loads decreases with increasing dynamic viscosity and density of the fluids (among 55% and 85% Glycerol-water solutions) in bimodal- and trimodal-frequency excitations. In addition, steady-state observables are achieved at only particular eigenmodes in single- and multi-frequency operations depending on the nonlinearity level of the dynamic systems. It is highlighted that hydrodynamically forced periodic oscillations are obtained for the first and second eigenmodes by utilizing a nonlinear oscillator with the highest selected value of forced Van der Pol parameter ($\mu = 10^{30}$) for all excitation schemes. Clearly, higher eigenmodes require different ultra-high values for the nonlinearity parameter to acquire periodic vibrations in multi-modal operations. In general, achieving the steady-state observables at the eigenmodes is substantially critical in quantifying the dynamic responses to fluid properties. Under tetramodal-frequency excitation, the vibration frequency of around 7.33 MHz and amplitude of around 0.03 pm are achieved at the first eigenmode for 75% Glycerol-water solution. Therefore, the micro-cantilever nonlinear sensitivity to micro-rheological properties at the fundamental and higher eigenmodes could be improved by utilizing multi-frequency excitation schemes.

Date: July, 8, 2023.

Key words and phrases. Hydrodynamic force sensitivity, Micro-cantilever, Multi-frequency excitations, Forced Van der Pol oscillator.

REFERENCES

- [1] Z. Huang, P. Wen, and X. Zhou, Comparison of Different Excitation Schemes in Bimodal Atomic Force Microscopy in Air and Liquid Environments, *Acta Mechanica Solida Sinica*, Vol.34, N.163, pp.163–173(2021).
- [2] M. Damircheli and B. Eslami, Design of V-shaped cantilevers for enhanced multifrequency AFM measurements, *Beilstein Journal of Nanotechnology*, V.2020, N.11, pp.1525–1541 (2020).
- [3] S. An, S. D. Soares, S. Santos, and D. Ebeling, Energy transfer between eigenmodes in multimodal atomic force microscopy, *Nanotechnology*, Vol.25, N.47, 475701, (2014).
- [4] S. D. Soares and C. Chayla, Frequency response of higher cantilever eigenmodes in bimodal and trimodal tapping-mode atomic force microscopy, *Measurement Science and Technology*, Vol.21, N.12, 125502, (2014).
- [5] S. D. Soares, S. An, and C. J. Long, Multi-frequency tapping-mode atomic force microscopy beyond three eigenmodes in ambient air, *Beilstein Journal of Nanotechnology*, Vol.2014, N.5, pp.1637–1648, (2014).
- [6] T. Lai, M. J. Honen, B. Fang, and J. Wang, Decrease in adhesion force at silica-mica interface with short contact time due to dynamic formation process of liquid bridge revealed on an AFM, *The Journal of Adhesion*, Vol.98, N.10, pp.1501-1519, (2021).
- [7] M. Arshad, A. Maali, C. Claudet, L. Lobry, F. Peters, and E. Lemaire, An experimental study on the role of inter-particle friction in the shear-thinning behavior of non-Brownian suspensions, *Soft Matter*, Vol.17, N.25, pp.6088-6097, (2021).
- [8] Y. F. Dufrene, T. Ando, R. Garcia, D. Alsteens, D. Martinez-Martin, A. Engel, C. Gerber, and D. J. Muller, Imaging modes of atomic force microscopy for application in molecular and cell biology, *Nature Nanotechnology*, Vol.12, N.4, pp.295–307, (2017).
- [9] Y. M. Efremov, T. Okajima, and A. Raman, Measuring viscoelasticity of soft biological samples using atomic force microscopy, *Soft Matter*, Vol.16, N.1, pp.64–81, (2020).
- [10] G. Prakash, A. Raman, J. Rhoads, and R. G. Reifenberger, Parametric noise squeezing and parametric resonance of microcantilevers in air and liquid environments, *Review of Scientific Instruments*, Vol.83, N.6, 065109, (2012).
- [11] D. B. Haviland, C. A. van Eysden, D. Forchheimer, D. Platz, H. G. Kassa, and P. Leclere, Probing viscoelastic response of soft material surfaces at the nanoscale, *Soft Matter*, Vol.12, N.2, pp. 619-624, (2016).
- [12] W. Liu and C. Wu, Rheological Study of Soft Matters: A Review of Microrheology and Microrheometers, *Macromolecular Chemistry and Physics*, Vol.219, N.3, 1700307, (2018).
- [13] A. Farokh Payam, Sensitivity of flexural vibration mode of the rectangular atomic force microscope micro cantilevers in liquid to the surface stiffness variations, *Ultramicroscopy*, Vol.135, N.1, pp. 84-88, (2013).
- [14] Y. Wang, M. Masoumi, and M. Gaucher-Petitdemange, Damping analysis of a flexible cantilever beam containing an internal fluid channel: Experiment, modeling and analysis, *Journal of Sound and Vibration*, Vol.340, N.1, pp. 331-342, (2015).
- [15] J. E. Sader, T. P. Burg, J. Lee, and S. R. Manalis, Energy dissipation in microfluidic beam resonators: Effect of Poisson’s ratio, *Physical Review E*, Vol.84, N.2, 026304, (2011).

- [16] Y. Qiu, C. Chien, B. Maroulis, J. Bei, A. Gaitanarou, and E. Goggin, Extending applications of AFM to fluidic AFM in single living cell studies, *Journal of Cellular Physiology*, Vol.237, N.8, pp. 3222-3238, (2022).
- [17] M. Khan, S. Schmid, Z. Davis, S. Doan, and A. Boisen, Fabrication of resonant microcantilevers with integrated transparent fluidic channel, *Microelectronic Engineering*, Vol.88, N.8, pp. 2300-2303, (2011).
- [18] M. Khan, S. Schmid, P. Jensen, Z. Davis, W. Yan, E. Stenby, and A. Boisen, Online measurement of mass density and viscosity of pL fluid samples with suspended microchannel resonator, *Sensors and Actuators B: Chemical*, Vol.185, N.1, pp. 456-461, (2013).
- [19] M. F. Lumentut and M. J. Eiswell, Powering smart pipes with fluid flow: Effect of velocity profiles, *Computers and Structures*, Vol.258, N.1, 106680, (2022).
- [20] P. Belardinelli, A. F. D. Souza, E. Verlinden, J. Wei, U. Staufer, F. Alijani, and M. K. Ghatkesar, Second flexural and torsional modes of vibration in suspended microfluidic resonator for liquid density measurements, *Journal of Micromechanics and Microengineering*, Vol.30, N.5, 055003, (2020).
- [21] T. A. Waigh, Advances in the microrheology of complex fluids, *Reports on Progress in Physics*, Vol.79, N.7, 074601, (2016).
- [22] E. Lemaire, M. Heinisch, B. Caillard, B. Jakoby, and I. Dufour, Comparison and experimental validation of two potential resonant viscosity sensors in the kilohertz range, *Measurement Science and Technology*, Vol.24, N.8, 084005, (2013).
- [23] G. Wang, C. Tan, and F. Li, A contact resonance viscometer based on the electromechanical impedance of a piezoelectric cantilever, *Sensors and Actuators A: Physical*, Vol.267, N.1, pp. 401-408, (2017).
- [24] I. Dufour, E. Lemaire, B. Caillard, H. Debeda, C. Lucat, S. Heinrich, F. Josse, and O. Brand, Effect of hydrodynamic force on microcantilever vibrations: Applications to liquid-phase chemical sensing, *Sensors and Actuators B: Chemical*, Vol.192, N.1, pp. 664-672, (2014).
- [25] J. Fu, Y. Chen, Z. Yu, and X. Zhang, Enhanced heat transfer research in liquid-cooled channel based on piezoelectric vibrating cantilever, *Thermal Science*, Vol.25, N.2, pp. 823-832, (2021).
- [26] J. Mouro, B. Tiribilli, and P. Paoletti, Measuring viscosity with nonlinear self-excited microcantilevers, *Applied Physics Letters*, Vol.111, N.14, 144101, (2017).
- [27] L. Zhao, Y. Hu, T. Wang, J. Ding, X. Liu, Y. Zhao, and Z. Jiang, A MEMS Resonant Sensor to Measure Fluid Density and Viscosity under Flexural and Torsional Vibrating Modes, *Sensors*, Vol.16, N.6, 830, (2016).
- [28] O. Cakmak, C. Elbuken, E. Ermek, A. Mostafazadeh, I. Baris, B. Erdem Alaca, I. H. Kavakli, and H. Urey, Microcantilever based disposable viscosity sensor for serum and blood plasma measurements, *Sensors*, Vol.63, N.3, pp. 225-232, (2013).
- [29] I. Dufour, A. Maali, Y. Amarouchene, C. Ayela, B. Caillard, A. Darwiche, M. Guirardel, H. Kellay, E. Lemaire, F. Mathieu, C. Pellet, D. Saya, M. Youssry, L. Nicu, and A. Colin, The Microcantilever: A Versatile Tool for Measuring the Rheological Properties of Complex Fluids, *Journal of Sensors*, Vol.2012, N.1, 719898, (2012).
- [30] J. Mouro, B. Tiribilli, and P. Paoletti, Nonlinear behaviour of self-excited microcantilevers in viscous fluids, *Journal of Micromechanics and Microengineering*, Vol.27, N.9, 095008, (2017).

- [31] G. Rezazadeh and M. Ghanbari, On the Mathematical Modeling of a MEMS-Based Sensor for Simultaneous Measurement of Fluids Viscosity and Density, *Sensing and Imaging*, Vol.19, N.1, 27, (2018).
- [32] M. Youssry, E. Lemaire, B. Caillard, A. Colin, and I. Dufour, On-chip characterization of the viscoelasticity of complex fluids using microcantilevers, *Measurement Science and Technology*, Vol.23, N.12, 125306, (2012).
- [33] B. Yang, Z. Wang, H. Tian, and J. Yin, Symplectic Dynamics and Simultaneous Resonance Analysis of Memristor Circuit Based on Its van der Pol Oscillator, *Symmetry*, Vol.14, N.6, 1251, (2022).
- [34] H. Yabuno, H. Kamekura, M. Kuroda, and T. Kobayashi, Van der Pol type self-excited micro-cantilever probe in atomic force microscopy, *Nonlinear Dynamics*, Vol.54, N.1, pp. 137-149, (2008).
- [35] A. Salas L., J. Martinez H, and D. L. Ocampo R, Analytical and Numerical Study to a Forced Van der Pol Oscillator, *Mathematical Problems in Engineering*, Vol.2022, N.1, 9736427, (2022).
- [36] Y. Yu, W. Zhou, Z. Zhang, and Q. Bi, Analysis on the motion of nonlinear vibration with fractional order and time variable mass, *Applied Mathematics Letters*, Vol.124, N.1, 107621, (2022).
- [37] B. Soares and N. Srinil, Modelling of wake-induced vibrations of tandem cylinders with a nonlinear wake-deficit oscillator, *Journal of Fluids and Structures*, Vol.105, N.1, 103340, (2021).
- [38] C. Yilmaz, R. Sahin, and E. S. Topal, Exploring the static acoustic force sensitivity using AFM micro-cantilever under single- and bimodal-frequency excitation, *Measurement Science and Technology*, Vol.32, N.11, 115001, (2021).
- [39] J. Mouro, R. Pinto, P. Paoletti, and B. Tiribilli, Microcantilever: Dynamical Response for Mass Sensing and Fluid Characterization, *Sensors*, Vol.21, N.1, 115, (2020).
- [40] J. E. Sader, Frequency response of cantilever beams immersed in viscous fluids with applications to the atomic force microscope, *Journal of Applied Physics*, Vol.84, N.1, pp. 64-76, (1998).
- [41] A. Maali, C. Hurth, R. Boisgard, C. Jai, T. Cohen- Bouhacina, and J.-P. Aime, Hydrodynamics of oscillating atomic force microscopy cantilevers in viscous fluids, *Journal of Applied Physics*, Vol.97, N.7, 074907, (2005).
- [42] R. Garcia and E. T. Herruzo, The emergence of multifrequency force microscopy, *Nature Nanotechnology*, Vol.7, N.4, pp. 217-226, (2012).

AKDENIZ UNIVERSITY, VOCATIONAL SCHOOL OF TECHNICAL SCIENCES, DEPARTMENT OF ELECTRONIC AND AUTOMATION, 07058, ANTALYA, TURKEY
Email address: cagriyilmaz@akdeniz.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp:5

GENERATORS OF F/R' LEIBNIZ ALGEBRAS

ZEYNEP ÖZKURT

0000-0001-9703-3463

ABSTRACT

Let F be a free Leibniz algebra generated by the set $X = \{x_1, \dots, x_n\}$ over the field K of characteristic 0 and let R be an ideal of F . In this study, a necessary and sufficient condition for n elements of the Leibniz algebra F/R' to be a generating set is given.

REFERENCES

- [1] Y. Bahturin and S. Nabiyev, Automorphisms and derivations of abelian extensions of some Lie algebras, *Abh. Math. Sem. Univ. Hamburg*, 62, 43-57 (1992)
- [2] J. S. Birman, An inverse function theorem for free groups, *Proc. Amer. Math. Soc.*, 41,634-638 (1973).
- [3] J. L. Loday and T. Pirashvili, Universal enveloping algebras of Leibniz algebras and (co)homology, *Math. Ann.*, 296, 139-158 (1993).
- [4] A. A. Mikhalev and U. U. Umirbaev, Subalgebras of free Leibniz algebras, *Commun. Algebra*, 26, 435–446 (1998).
- [5] V. Shpilrain, On generators of L/R^2 Lie algebras, *Proc. Amer. Math. Soc.*, 119, No.4, 1039-1043(1993).
- [6] A.L. Smel'kin, Wreath products of Lie algebras and their application in the theory of groups, *Trans. Moskov. Math. Soc.*, 29, (1973).
- [7] T. Taş Adiyaman and Z. Özkurt, Automorphisms of free metabelian Leibniz algebras of rank three, *Turk. J. Math.*, 43, No.5, 2262–2274(2019).
- [8] T. Taş Adiyaman and Z. Özkurt, Automorphisms of free metabelian Leibniz algebras, *Comm. Algebra*, 49, No.10, 4348–4359(2021).
- [9] U. U. Umirbaev, Partial derivatives and endomorphisms of some relatively free Lie algebras, *Sib.Math.J.*, 34, 1161-1170(1993).

ÇUKUROVA UNIVERSITY, DEPARTMENT OF MATHEMATICS, ADANA, TURKEY
Email address: zyapti@cu.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 17A32; 17A36.

Key words and phrases. Leibniz algebras, Generating sets, Automorphism.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 6-7

THE NECESSITY OF USING RECYCLED WASTE AGGREGATE IN TURKIYE

EREN YAĞMUR

0000-0001-5938-0501

ABSTRACT

Concrete is the most commonly used construction material in the world. According to the amount of concrete production announced every year, Türkiye ranks first among all European countries in ready-mixed concrete production. It is a major concern for sustainability as we use large amounts of natural resources to produce materials such as concrete. Approximately 75% aggregate can be used in the production of normal-strength concrete. On the other hand, Türkiye is located on the Alpine-Himalayan seismic belt, and high-intensity earthquakes are expected to occur frequently. As a result of the destructive effects of these earthquakes, a significant amount of demolition waste is generated. 11 provinces were affected by the last Kahramanmaraş earthquakes in our country, and the number of heavily damaged or destroyed buildings is given as 61222, according to the records. Using these wastes as effectively as possible will ensure both savings in raw material usage and the beneficial elimination of these high-rate wastes, which have many negative effects. In this study, the effect of the recycled aggregate added to the concrete mix in different proportions on the mechanical properties of the concrete and its usability was investigated.

REFERENCES

- [1] A.A. Elhakam, A.E. Mohame, and E. Awad, Influence of self-healing, mixing method and adding silica fume on mechanical properties of recycled aggregates concrete, *Constr. Build. Mater.*, Vol.35, pp.421-427 (2012). DOI: 10.1016/j.conbuildmat.2012.04.013.
- [2] M. Etxeberria, E. Vazquez, A. Mari and M. Barra, Influence of amount of recycled coarse aggregates and production process on properties of recycled aggregate concrete, *Cem. Concr. Res.*, Vol.37, N.7, pp.735-742 (2007). DOI: 10.1016/j.cemconres.2007.02.002.
- [3] S.C. Kou and C.S. Poon, Enhancing the durability properties of concrete prepared with coarse recycled aggregate, *Constr. Build. Mater.*, Vol.35, pp.69-76 (2012). DOI:

Date: July, 8, 2023.

Key words and phrases. Recycled waste aggregate, Earthquake, Concrete.

10.1016/j.conbuildmat.2012.02.032.

- [4] W.H. Kwan, M. Ramli, K.J. Kam, and M.Z. Sulaiman, Influence of the amount of recycled coarse aggregate in concrete design and durability properties, *Constr. Build. Mater.*, Vol.26, pp.565-573 (2012). DOI: 10.1016/j.conbuildmat.2011.06.059.

ABDULLAH GÜL UNIVERSITY, CIVIL ENGINEERING DEPARTMENT, 38080, KAYSERİ, TÜRKİYE
Email address: eren.yagmur@gu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 8-9

**THE GRADIENT AND PARTIAL DERIVATIVES OF
BICOMPLEX NUMBERS: A COMMUTATIVE-QUATERNION
APPROACH**

ALI ATASOY

0000-0002-1894-7695

ABSTRACT

The study of bicomplex numbers, specifically commutative-quaternions, offers a fascinating exploration into the properties of complexified quaternions with commutative multiplication. Understanding the gradient and partial derivatives within this mathematical framework is crucial for analyzing the behavior of bicomplex functions. Real quaternions are not commutative but bicomplex numbers are commutative by multiplication. Bicomplex numbers are the special case of real quaternions. In this study, gradient and partial derivatives are obtained for bicomplex number valued functions.

REFERENCES

- [1] B. Akyar, Dual quaternions in spatial kinematics in an algebraic sense, Turkish Journal of Mathematics, vol.32, pp.373-391 (2008).
- [2] D. P. Mandic, C. C. Took, A Quaternion Gradient Operator and Its Applications, IEEE Signal Processing Letters, Vol.18, N.1., pp.47-49 (2011).
- [3] J. F. Weisz, Comments on mathematical analysis over quaternions, Int. J. Math. Educ. Sci. Technol., Vol.22, N.4, pp.499-506 (1991).
- [4] N. Masrouri, Y. Yaylı and M. H. Faroughi M. Mirshafizadeh, Comments On Differentiable Over Function of Split Quaternions, Revista Notas de Matemática, Vol.7(2), N.312, pp.128-134 (2011).
- [5] G. B. Price, An Introduction to Multi-complex Spaces and Functions, Marcel Dekker Inc., New York, (1991).
- [6] W. R. Hamilton, On quaternions. The London, Edinburgh, and Dublin Phil. Mag. J. Sci. Vol.25(169), pp.489-495 (1844).
- [7] W. R. Hamilton, Elements of Quaternions, Chelsea, New York, (1866).
- [8] M. Jiang, Y. Li and W. Liu, Properties of a general quaternion-valued gradient operator and its applications to signal processing, Frontiers Inf Technol Electronic Eng., Vol.17, pp.83-95 (2016). <https://doi.org/10.1631/FITEE.1500334>
- [9] T. A. Ell and S. J. Sangwine, Quaternion involutions and anti-involutions, Computers & Mathematics with Applications, Vol. 53, N.1, pp. 137-143 (2007).

Date: July, 8, 2023.

2020 Mathematics Subject Classification. 11R52; 30G35.

Key words and phrases. Bicomplex number, Quaternion, Partial derivate, Gradient.

- [10] D. Rochon, M. Shapiro, On algebraic properties of bicomplex and hyperbolic numbers, An. Univ. Oradea Fasc. Mat., Vol.11, pp. 71-110 (2004).
- [11] F. Catoni, R. Cannata and P. Zampetti, An introduction to Commutative Quaternions, Advances in Applied Clifford Algebras, Vol.10, pp.1-28 (2006). <https://doi.org/10.1007/s00006-006-0002-y>.

KIRIKKALE UNIVERSITY, KESKIN VOCATIONAL SCHOOL, 71300, KIRIKKALE, TURKEY
Email address: aliatasoy@kku.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 10

A FUZZY SOFT SET-BASED APPROACH TO IDENTIFY ACADEMIC DISHONESTY AND MISCONDUCT

ESRA KORKMAZ

0000-0002-1065-5612

ABSTRACT

Academic dishonesty and misconduct are significant challenges in educational settings, posing serious threats to academic integrity and students' well-being. Addressing this problem requires an effective decision-making to determine appropriate interventions and sanctions. In this study, we present a novel approach that utilizes fuzzy soft sets, resulting in robust and flexible decision-making processes.

REFERENCES

- [1] F. Feng, Y.B. Jun, X. Liu, L. Li, An adjustable approach to fuzzy soft set based decision making, J. Comput. Appl. Math., Vol. 234, 10-20, (2010).
- [2] Z. Kong, L. Gao, L. Wang, Comment on "A fuzzy soft set theoretic approach to decision making problems", J. Comput. Appl. Math., Vol. 223, 540-542, (2009).
- [3] E. Korkmaz, C. Özcan, M. Korkmaz, An application of fuzzy soft sets to a real-life problem: Classification of wood materials to prevent fire-related injuries and deaths, Applied Soft Computing, Vol.132, Article 109875, (2023).

DÜZCE UNIVERSITY, DEPARTMENT OF COMPUTER PROGRAMMING, 81800, DÜZCE, TURKEY
Email address: esrakorkmaz@duzce.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 03E72; 91F99.

Key words and phrases. Weighted fuzzy soft set, Decision-making, Academic dishonesty .

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 11-12

SECOND ORDER MODEL REDUCTION OF HIGHER ORDER SYSTEMS AND PID CONTROLLER DESIGN

ALİ YÜCE

ABSTRACT

Reduced order systems are used to avoid computational complexity in higher order plant models. Low-order or standardized transfer functions are more suitable for controller design. In addition, Salem presented a non-overshoot and analytical PID controller design technique for standard quadratic systems. In this study, efficient PID controller design for high-order systems is carried out with the help of a second-order reduced model. The curve fitting technique is used to reduce the model to the second-order structure. The open loop unit step response of the higher order system is fitted with the parametric unit step response of the standard quadratic system. Particle Swarm Optimization (PSO) algorithm is used to detect unknown ζ and ω_n parameters. The analytical method proposed by Salem has been applied for the PID controller design of second-order model. Thus, PID controller design for any higher order system is performed in two stages using model reduction and model based PID controller design techniques. It has been seen that the efficient PID controller designed for the second order equivalent models is a suitable design for the higher order system.

REFERENCES

- [1] K. J. Åström and T. Hägglund, The future of PID control, Control engineering practice, Vol. 9, N. 11, pp. 1163-1175, (2001).
- [2] K. J. Åström and T. Hägglund, PID controllers: theory, design, and tuning. Isa Research Triangle Park, NC, (1995).
- [3] J.-G. Juang, R.-W. Lin, and W.-K. Liu, Comparison of classical control and intelligent control for a MIMO system, Applied Mathematics and computation, Vol. 205, N. 2, pp. 778-791, (2008).
- [4] M. S. Saad, H. Jamaluddin, and I. Z. M. Darus, Implementation of PID controller tuning using differential evolution and genetic algorithms, International Journal of Innovative Computing, Information and Control, Vol. 8, N. 11, pp. 7761-7779, (2012).
- [5] R. Sanchis, J. A. Romero, and P. Balaguer, Tuning of PID controllers based on simplified single parameter optimisation, International Journal of Control, Vol. 83, N. 9, pp. 1785-1798, (2010).

Date: July, 8, 2023.

Key words and phrases. Higher order system, Second order system, Model reduction, Particle Swarm Optimization, PID controller design.

- [6] Z.-Y. Zhao, M. Tomizuka, and S. Isaka, Fuzzy gain scheduling of PID controllers, *IEEE transactions on systems, man, and cybernetics*, Vol. 23, N. 5, pp. 1387-1398, (1993).
- [7] D. Karaboga and B. Akay, Proportional—integral—derivative controller design by using artificial bee colony, harmony search, and the bees algorithms, *Proceedings of the Institution of Mechanical Engineers, Part I: Journal of Systems and Control Engineering*, Vol. 224, N. 7, pp. 869-883, (2010).
- [8] V. Nicolau, On PID controller design by combining pole placement technique with symmetrical optimum criterion, *Mathematical Problems in Engineering*, Vol. 2013, (2013).
- [9] F. A. Salem, New efficient model-based PID design method, *European scientific journal*, Vol. 9, N. 15, pp. 181-199, (2013).
- [10] K. J. Åström and T. Hägglund, Automatic tuning of simple regulators with specifications on phase and amplitude margin, *Automatica*, Vol. 20, N. 5, pp. 645-651, (1984).
- [11] Y. Tang and R. Ortega, Adaptive tuning to frequency response specifications, *Automatica*, Vol. 29, N. 6, pp. 1557-1563, (1993).
- [12] B. B. Alagöz, F. D. Deniz, and N. Tan, Yüksek dereceli sistemlerin kararlılık sınırları ile ikinci derece yeğlensin modelle indirgenmesi ve uygun PID kontrolör tasarımı, *Otomatik Kontrol Ulusal Kongresi, Isparta, Türkiye*, (2014).
- [13] T.N. Lucas, Constrained optimal Padé model reduction, *J. Dyn. Sys., Meas., Control*, Vol. 119, N. 6, pp. 685-690, (1997).
- [14] K. Samburaya, O. Sharma, Routh approximation: an approach of model order reduction in MISO and MIMO systems, *Indonesian Journal of Electrical Engineering and Computer Science*, Vol. 2, N. 3, pp. 486-500, (2016).
- [15] B. F. Duddeti, Order reduction of large-scale linear dynamic systems using balanced truncation with modified Cauey continued fraction, *IETE Journal of Education*, pp. 1-12, (2023). doi:10.1080/09747338.2023.2178530
- [16] Y. Shi and R. C. Eberhart, Empirical study of particle swarm optimization, in *Proceedings of the 1999 congress on evolutionary computation-CEC99*, Vol. 3, pp. 1945-1950, (1999).
- [17] J. Kennedy and R. Eberhart, Particle swarm optimization, in *Proceedings of ICNN'95-international conference on neural networks*, Vol. 4, pp. 1942-1948, (1995).
- [18] Y. Shi, Particle swarm optimization: developments, applications and resources, in *Proceedings of the 2001 congress on evolutionary computation*, 2001, Vol. 1, pp. 81-86, (2001).
- [19] Y. Shi and R. C. Eberhart, Parameter selection in particle swarm optimization, in *Evolutionary Programming VII: 7th International Conference, EP98 San Diego, California, USA, March 25-27, 1998 Proceedings 7*, 1998: Springer, pp. 591-600, (1998).
- [20] X.-S. Yang, *Nature-inspired optimization algorithms*. Academic Press, (2020).
- [21] D. Graham and R. C. Lathrop, The synthesis of optimum transient response: criteria and standard forms, *Transactions of the American Institute of Electrical Engineers, Part II: Applications and Industry*, Vol. 72, N. 5, pp. 273-288, (1953).
- [22] D. Atherton and A. Boz, Using standard forms for controller design, in *UKACC International Conference on Control'98 (Conf. Publ. No. 455)*, 1998: IET, pp. 1066-1071, (1998).
- [23] S. B. Joseph, E. G. Dada, A. Abidemi, D. O. Oyewola, and B. M. Khammas, Metaheuristic algorithms for PID controller parameters tuning: Review, approaches and open problems, *Heliyon*, Vol. 8, pp. 1-29 (2022).
- [24] R. Mansouri, M. Bettaye, S. Djennoune, Approximation of high order integer systems by fractional order reduced-parameters models, *Mathematical and Computer Modelling*, Vol. 51, pp. 53-62 (2010).

MALATYA TURGUT ÖZAL UNIVERSITY, DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING, 44200, MALATYA, TURKEY

Email address: ali.yuce@ozal.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 13-14

ON THE EXPONENTIAL STABILITY OF STATIONARY AND PERTURBED IMPLICIT SYSTEMS

NOR ELHOULA BEGHERSA, M. BENABDALLAH, AND M. HARIRI

0000-0002-5010-7899

ABSTRACT

In the present work, we study the exponential stability of the stationary differential systems of the form: $Ax'(t) - Bx(t) = 0$ for all $t \geq t_0$, where A and B are linear bounded operators in Hilbert spaces. The obtained results on the one hand are the generalization of the Liapounov theorem for the spectrum of the operator pencil $\lambda A - B$. On the other hand, the establishment of the exponential stability conditions for the stationary and perturbed systems described by as: $Ax'(t) - (B + B(t))x(t) = 0$.

REFERENCES

- [1] R. Bellman, K.L. Cooke, Differential-difference equations, Academic Press, London, (1963).
- [2] M. Benabdallah, M. Hariri, On the stability of the quasi-linear implicit equations in Hilbert spaces, Khayyam.J.Math, Vol.5,N.1, pp 105-112 (2019).
DOI 10.22034/kjm.2019.81222.
- [3] S.L. Gefter, A.L. Piven, Implicit linear non-homogeneous difference equation in Banach and locally convex spaces, J.Math physics, analysis, geometry, vol 15,N.3, pp.336-353 (2019).
DOI: <https://doi.org/10.15407/mag15.03.336>.
- [4] L.A. Vlasenko, Evolutionary models with implicit and degenerate differential equations, Sistemnye tehnologii, Dniepropetro-vsk, (2006).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 34DXX, 34L10; 34LXX, 65LXX.

Key words and phrases. Exponential stability, Operator pencil, Implicit stationary equation, Perturbed equation.

UNIVERSITY OF SCIENCES AND TECHNOLOGY MOHAMED BOUDIAF OF ORAN USTO-MB, DEPARTMENT OF MATHEMATICS, 31000, ORAN, ALGERIA

Email address, author one: `norelhouda.begher@univ-usto.dz`

UNIVERSITY OF SCIENCES AND TECHNOLOGY MOHAMED BOUDIAF OF ORAN USTO-MB, DEPARTMENT OF MATHEMATICS, 31000, ORAN, ALGERIA

Email address, author two: `mehdi.benabdallah@univ-usto.dz`

AIN TEMOUCHENT UNIVERSITY DEPARTMENT OF MATHEMATICS, 46000, AIN TEMOUCHENT, ALGERIA

Email address, author three: `med.hariri@univ-temouchent.edu.dz`

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 15

LOCALLY RECOVERABLE CODES BASED ON THE MATRICES DERIVED FROM THE MAGIC SQUARES

RABİA ZENGİN AND MEHMET EMİN KÖROĞLU

0009-0008-6780-4771 and 0000-0002-9173-4944

ABSTRACT

An (n, t, r) locally recoverable code (for shortly LRC) is a code of length n and dimension k over a finite field such that a symbol in any coordinate of a codeword can be recovered by accessing the symbols in at most r other coordinates. These codes are used in distributed storage systems by Microsoft Azure and Hadoop since they can recover a failed node by accessing the minimum number of the surviving nodes. A matrix is called as an (r, t) -regular matrix if its each row has uniform weight r and each column has uniform weight t . In this study, new (r, t) -regular matrices are obtained by using the magic squares and the parametrization of an LRC code is given by using these (r, t) -regular matrices.

REFERENCES

- [1] P. Gopalan, C. Huang, H. Simitci, S. Yekhanin, On the locality of codeword symbols, IEEE Transactions on Information theory, 58(11), 6925-6934 (2012).
- [2] J. Hao, S. T. Xia, Constructions of optimal binary locally repairable codes with multiple repair groups, IEEE Communications Letters, 20(6), 1060-1063 (2016).
- [3] Keedwell, A. Donald, J. Dénes, Latin squares and their applications, Elsevier, Budapest, (2015).

İSTANBUL BILGI UNIVERSITY, DEPARTMENT OF MATHEMATICS, 34440, İSTANBUL, TURKEY
Email address: rabia.zengin@bilgi.edu.tr

YILDIZ TECHNICAL UNIVERSITY, DEPARTMENT OF MATHEMATICS, 34220, İSTANBUL, TURKEY
Email address: mkoroglu@yildiz.edu.tr

Date: July, 8, 2023.

2020 Mathematics Subject Classification. 94B05; 94B60.

Key words and phrases. Locally recoverable codes, Magic squares.

This research is supported by Yildiz Technical University Scientific Research Projects Coordination Department with Project Number FYL-2023-5605.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 16-17

NEW NUMBER SEQUENCES BUILT ON HYBRID NUMBERS

M. UYSAL AND E. ÖZKAN

ABSTRACT

In this study, we define new number sequences with the help of hybrid numbers. We give the basic definitions and properties of these number sequences. We examine some properties associated with these numbers. We obtain Binet's Formulas and generating functions and calculate some important identities such as Cassini's identity of these hybrid number sequences.

REFERENCES

- [1] A. Behera, G.K. Panda, On the square roots of triangular numbers. *Fibonacci Quart.*, 37(2), 98–105 (1999).
- [2] A. Patra, M. K.A Kaabar, Catalan Transform of k-Balancing Sequences, *International Journal of Mathematics and Mathematical Sciences*, 9987314 (2021).
- [3] A. Szynal-Liana, The Horadam hybrid numbers, *Discussiones Mathematicae-General Algebra and Applications*, 38(1), 91-98 (2018).
- [4] E. Özkan, M. Uysal, Mersenne-Lucas hybrid numbers, *Mathematica montisnigri*, 52(2),17-29 (2021).
- [5] E. Polath, A note on ratios of Fibonacci hybrid and Lucas hybrid numbers, *Notes Number Theory Discrete Math*, 27(3), 73-78 (2021).
- [6] G.K. Panda, S.S. Rout, Gap balancing numbers, *Fibonacci Quart.*, 51, 239–48 (2013).
- [7] G.K. Panda, Some fascinating properties of balancing numbers, *Congr. Numer.*, 194, 185–189 (2009).
- [8] M. Özdemir, Introduction to hybrid numbers, *Advances in Applied Clifford Algebra.*, 28(1), 1-32 (2018).
- [9] M. Uysal, E. Özkan, Padovan hybrid quaternions and some properties, *Journal of Science and Arts*, 22(1), 121-132 (2022).
- [10] P. Catarino, On k-Pell hybrid numbers, *Journal of Discrete Mathematical Sciences and Cryptography*, 22(1), 83-89 (2019).
- [11] P. K. Ray, Balancing and Lucas-balancing sums by matrix methods, *Mathematical Reports*, 17(2), 225-233 (2015).
- [12] R. Frontczak, On Balancing Polynomials, *Appl. Math. Sci.*, 13, 57-66 (2019).
- [13] T. Kova'cs, K. Liptai, P. Olajos, on (a, b)-type balancing numbers, *Publ. Math. Debrecen*, 77, 485–98 (2010).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 11B39, 11B83; 05A15.

Key words and phrases. Hybrid numbers, Binet's Formula, Cassini's identity.

(M. Uysal) ERZINCAN BINALI YILDIRIM UNIVERSITY, GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES, 24100 ERZINCAN, TURKEY.

Email address: mine.uysal@erzincan.edu.tr

(E. Özkan) ERZINCAN BINALI YILDIRIM UNIVERSITY, DEPARTMENT OF MATHEMATICS, FACULTY OF ARTS AND SCIENCES, 24100 ERZINCAN, TURKEY.

Email address: eozkan@erzincan.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 18

MODELING AND ANALYSIS OF CAPACITATED NONLINEAR NETWORK TRAFFIC ASSIGNMENT PROBLEM

HASAN DALMAN

ABSTRACT

This paper is devoted to the study of Traffic Assignment Problems with Capacities [3]. The traffic network is represented as a directed graph consisting of nodes and connections ([1]-[4]). The problem aims to determine the user flow pattern in a transportation network while considering capacity limitations on the links. As it is well known, when the capacity of a link reaches its saturation point, the traffic volume starts to increase, leading to congestion and queues. In such networks, the focus is on each user selecting their optimal path. In this study, the static network is transformed into a dynamic one to find the user equilibrium. The neural dynamic network approach, employing Euler and Runge-Kutta methods, is utilized to analyze congestion and flow dynamics in the network.

REFERENCES

- [1] M. Beckmann, C.B. McGuire, and C.B. Winsten, Studies in the Economics of Transportation, CT: Yale University Press, New Haven, (1956).
- [2] C.F. Daganzo, On the traffic assignment problem with flow dependent costs—II, Transportation Research, Vol. 11, N. 6, pp. 439–441, (1977).
- [3] Y. Sheffi, Urban Transportation Networks: Equilibrium Analysis with Mathematical Methods, NJ: Prentice-Hall, Englewood Cliffs, (1985)
- [4] J.G. Wardrop, Some theoretical aspects of road traffic research, In Proceedings of the Institute of Civil Engineers, Vol 1, N. 3, pp. 325–362, (1952)

BATMAN UNIVERSITY, MATHEMATICS DEPARTMENT, 72000, BATMAN, TURKEY
Email address: hasan.dalman@batman.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 65K05, 92B20; 05C50, 05C85.

Key words and phrases. Network traffic assignment, nonlinear optimization, system theory.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 19

CYCLIC DNA CODES OVER MIXED ALPHABETS

TULAY YILDIRIM

ABSTRACT

In this paper we purpose to construct cyclic DNA codes over the mixed alphabets. We discuss their generator polynomials as well as the structure of seperable codes. Using the structure of these codes, we study cyclic DNA codes. By using Gray map, we define correspondence between DNA codons of alphabets and the elements of the ring. Also, we discuss some conditions of cyclic codes over the given ring to be reversible and reversible-complement. As applications, we provide examples of new cyclic DNA codes.

REFERENCES

- [1] Abualrub T, Ghrayeb A, Zeng XN Construction of cyclic codes over $GF(4)$ for DNA computing. J. Frankl. Inst. 343: 448–457 (2006).
- [2] Bayram A, Oztas E, Siap I Codes over $F_4 + vF_4$ and some DNA applications,. Des. Codes Cryptogr.80:379–393 (2016).
- [3] Bennenni N, Guenda K, Mesnager S New DNA cyclic codes over rings. Adv. Math. Comp 11(1):83-98 (2017).
- [4] Dinh HQ, Pathak S, Upadhyay AK, Yamaka W New DNA codes from cyclic codes over mixed alphabets. Mathematics 8(11): 1-24 (2020).
- [5] Dinh HQ, Singh AK, Pattanayak S, Sriboonchitta S Cyclic DNA codes over the ring $F_2 + uF_2 + vF_2 + uvF_2 + v_2F_2 + uv_2F_2$. Des. Codes Cryptogr. 86: 1451-1467 (2018).
- [6] Liu J, Liu H Construction of cyclic DNA codes over the ring $Z_4 + vZ_4$. IEEE Access 8: 111200–111207 (2020).

KARABUK UNIVERSITY, ESKIPAZAR VOCATIONAL SCHOOL, KARABUK, TURKEY
Email address: tulayturan@karabuk.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 94B05, 94B15 ; 94A45.

Key words and phrases. DNA codes over rings, Gray map, Linear codes, Mixed alphabets, Reversible codes, Reversible-complement codes.

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 20-21

SOLVABILITY AND GUH STABILITY RESULTS OF FUZZY NONLINEAR ABC -FRACTIONAL COUPLED SYSTEM

AZIZ EL CHAZOUANI, M'HAMED ELOMARI, AND SAID MELLIANI

0000-0003-3380-2977, 0000-0002-4256-1434 and 0000-0002-5150-1185

ABSTRACT

In this paper, we mainly take into account a fuzz nonlinear Atangana Baleau Caputo fractional coupled equations. After discussing several key ideas on fuzzy ABC operator, some new and easily verifiable sufficient criteria of solvability are obtained. We further prove that this system is generalized Ulam Hyers (GUH) stable. Finally, an example is applied to explain the availability of our major results.

REFERENCES

- [1] B. Bede and S. G. Gal. *Generalizations of the differentiability of fuzzy-number-valued functions with applications to fuzzy differential equations*, Fuzzy sets and systems, 151(3), 581-599, (2005), <https://doi.org/10.1016/j.fss.2004.08.001>.
- [2] A. El ghazouani et al. On the existence and uniqueness of fuzzy mild solution of fractional evolution equations. Kragujevac Journal of Mathematics 49.6 (2025): 949-966.
- [3] B. Bede and L. Stefanini, Generalized differentiability of fuzzy-valued functions, Fuzzy Sets and Systems 230 (2013) 119-141, <https://doi.org/10.1016/j.fss.2012.10.003>.
- [4] T. Allahviranloo, B. Ghanbari, On the fuzzy fractional differential equation with interval Atangana-Baleanu fractional derivative approach, Chaos Soliton. Fract., 130 (2020), 109-397. <https://doi.org/10.1016/j.chaos.2019.109397>
- [5] A. Atangana, D. Baleanu, New fractional derivatives with nonlocal and non-singular kernel: theory and application to heat transfer model, Therm. Sci., 20 (2016), 763-769. <https://doi.org/10.2298/TSCI160111018A>
- [6] Allahviranloo T, Armand A, Gouyandeh Z. Explicit solutions of fractional differential equations with uncertainty. J Intell Fuzzy Syst 2014;26(3):1481-90. <https://doi.org/10.3233/IFS-130831>.
- [7] Allahviranloo T, Salahshour S, Abbasbandy S. Explicit solutions of fractional differential equations with uncertainty. Soft Comput 2012;16:297. <https://doi.org/10.1007/s00500-011-0743-y>
- [8] Arara A, Benchohra M, Hamidi N, Nieto JJ. Fractional order differential equations on an unbounded domain. Nonlinear Anal, 72:580-6, (2010). <https://doi.org/10.1016/j.na.2009.06.106>.
- [9] Babenko YI. Heat and mass transfer. Leningrad: Chemia; (1986).

Date: July, 8, 2023.

2010 Mathematics Subject Classification. 34A34; 33B15, 35A22.

Key words and phrases. Atangana Baleau Caputo fractional coupled equations, Generalized Ulam Hyers Stability, solvability, Banach's contraction mapping principle.

- [10] Zimmermann HJ. Fuzzy set theory-and its applications. Kluwer Academic Publishers; (1985). <https://doi.org/10.1007/978-94-015-7153-1>
- [11] Kilbas AA, Srivastava HM, Trujillo JJ. Theory and applications of fractional differential equations. Amsterdam: Elsevier Science; V; (2001).
- [12] Lakshmikantham V, Leela S, Devi JV. Theory of fractional dynamic systems. Cambridge, UK: Cambridge Scientific Pub; (2009).
- [13] Agrawal RP, Lakshmikantham V, Nieto JJ. On the concept of solution for fractional differential equations with uncertainty. *Nonlinear Anal*, 72:2859-62, (2010). <https://doi.org/10.1016/j.na.2009.11.029>.
- [14] Bede B, Rudas IJ, Bencsik AL. First order linear fuzzy differential equations under generalized differentiability. *Inf Sci*, 177: 48-62 (2007). <https://doi.org/10.1016/j.ins.2006.08.021>.
- [15] Ulam, S. M. A collection of mathematical problems, Interscience Publishers, (1960).
- [16] Hyers, D. H. On the stability of the linear functional equation, *P. Natl. Acad. Sci. USA.*, 27 (1941), 222-224 <https://doi.org/10.1073/pnas.27.4.222>.

(AZIZ EL GHAZOUANI) LABORATORY OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING, SULTAN MOULAY SLIMANE UNIVERSITY, BENI MELLAL, MOROCCO
Email address: aziz.elghazouani@usms.ac.ma

(M'HAMED ELOMARI) LABORATORY OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING, SULTAN MOULAY SLIMANE UNIVERSITY, BENI MELLAL, MOROCCO
Email address: m.elomari@usms.ma

(SAÏF MELLIANI) LABORATORY OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING, SULTAN MOULAY SLIMANE UNIVERSITY, BENI MELLAL, MOROCCO
Email address: s.melliani@usms.ma

CLIQUE MATCHING NEIGHBORHOOD POLYNOMIAL OF GRAPHS

ANDRISON M. ASDAIN AND ROSALIO G. ARTES JR.

ABSTRACT

A *clique* in a graph G is a subset of $V(G)$ which induces a complete subgraph of G . If $v \in V(G)$, the *neighborhood* of v in G is the set $N_G(v) = \{u \in V(G) : uv \in E(G)\}$. For a subset S of $V(G)$, the *neighborhood system* of S in G is the set $N_G(S) = \bigcup_{s \in S} N_G(s) \setminus S$. Two edges in a graph G are said to be *incident* if they

share a common vertex. A subset T of $E(G)$ is said to be an *independent edge set* if T is mutually non-incident. An independent edge subset T of $E(G)$ is called a *matching*. The *matching neighborhood* of a subset S of $V(G)$ is a subset of the edge neighborhood system of S in G which is independent. The *clique matching neighborhood polynomial* of a graph G is given by $\Psi_{cmn}(G; x, y) = \sum_{j=0}^{n-i} \sum_{i=1}^{m(G)} m_{ij}(G) x^i y^j$,

where $m_{ij}(G)$ is the number of i -matching subsets of $E(G)$ with a matching neighborhood system of maximum cardinality equal to j and $m(G)$ is the cardinality of a maximum matching subset of $E(G)$, called the *matching number* of G . In this paper, we established the clique matching neighborhood polynomials of some special graphs and graphs resulting from some binary graph operations.

REFERENCES

- [1] J. Ellis-Monaghan, J. Merino. *Graph Polynomials and Their Applications II: Interrelations and Interpretations*. Birkhauser, Boston, (2011).
- [2] I. Gutman, F. Harary. Generalizations of the Matching Polynomial. *Utilitas Mathematica*, 24:97-106, (1983).
- [3] C. Hoede, X. Li. Clique Polynomials and independent set Polynomials of Graphs. *Discrete Mathematics*, 125:219-228, (1994).

Date: July, 8, 2023.

2020 Mathematics Subject Classification. 05C25, 05C30, 05C31.

Key words and phrases. Matching, Graph polynomial, Neighborhood system.

(Aldison M. Asdain) WESTERN MINDANAO STATE UNIVERSITY, DEPARTMENT OF MATHEMATICS AND STATISTICS, 7000, ZAMBOANGA CITY, PHILIPPINES
Email address: asdain.aldison@wmsu.edu.ph

(Rosario G. Artes Jr.) MINDANAO STATE UNIVERSITY - TAWI-TAWI, MATHEMATICS AND SCIENCES DEPARTMENT, 7500, BONGAO, TAWI-TAWI, PHILIPPINES
Email address: rosalioart@msutawi-tawi.edu.ph

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 24-25

ROLE OF THE WEAK ALLEE PHENOMENA ON A PREDATOR-PREY MODEL

F. KANGALGIL AND S. IŞIK

ABSTRACT

The Allee effect is known as a reduction of the per capita growth rate of a population of biological species at densities smaller than a critical value. An individual of a species that is subject to an Allee effect will suffer a decrease in some aspect of its fitness when conspecific density is low. The Allee effect which can have considerable effects on predator-prey dynamics has been classified into two categories: strong Allee effect and weak Allee effect. It is called a strong Allee effect if the per capita growth rate in the limit of low density is negative. It means that when the population density falls below a certain threshold, the population may struggle to grow or even face extinction. A weak Allee effect means that the per capita growth rate is positive at zero density. A predator-prey system with a strong Allee effect on the prey population can result in prey extinction or reduced predation dynamics. On the other hand, populations with weak Allee dynamics exhibit slower growth rates when their densities are low, but they never reach negative per-capita growth rates, meaning there is no specific threshold they need to surpass.

This study deals with a discrete-time predator-prey model which describes the interaction of prey and predator. The considered model is formed by adding the Allee effect on prey. The stability of the fixed point of the model and the existence conditions of the period-doubling bifurcation are investigated. In addition, the direction of the examined bifurcation is given. Moreover, several simulations to support our analysis results are given.

REFERENCES

- [1] Cheng, L., Cao, H., Bifurcation Analysis of a Discrete-Time Ratio-dependent Predator-Prey Model with Allee Effect, *Commun. Nonlinear Sci Numer Simulat*, Vol.38, pp.288-302, (2016). DOI:10.1016/J.CNSNS.2016.02.038.

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 37G35, 39A30, 39A28; 00A71.

Key words and phrases. Predator-prey system, Fixed point, Stability, Period-doubling bifurcation, Allee effect.

- [2] Pal S., Sasmal, S.K., Pal, N., Chaos Control in a Discrete Time Predator-Prey Model with Weak Allee Effect, International Journal of Biomathematics, Vol.11 No.7, 1850089, (2018). <https://doi.org/10.1142/S1793524518500894>.
- [3] Zhou, S., Liu, Y., and Wang, G., The stability of predator-prey systems subject to the Allee effects, Theoretical Population Biol, Vol.67, pp.23-31, (2005). <https://doi.org/10.1016/j.tpb.2004.06.007>.

(F. Kangalgil) BERGAMA VOCATIONAL SCHOOL, DOKUZ EYLUL UNIVERSITY, 35700, IZMIR, TURKEY

Current address: Bergama Vocational School, Dokuz Eylul University, 35700, Izmir, Turkey

Email address: figo.kangalgil@deu.edu.tr

(S. Işık) DEPARTMENT OF MATHEMATICS AND SCIENCE EDUCATION, FACULTY OF EDUCATION, SIVAS CUMHURİYET UNIVERSITY, 58140, SIVAS, TURKEY.

Email address: karacan@cumhuriyet.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 26

ON A GENERAL INCLUSION THEOREM

HİKMET SEYHAN ÖZARSLAN AND BAĞDAGÜL KARTAL

1000-0002-0437-032X and 0000-0001-6223-0838

ABSTRACT

In the present study, a theorem which gives necessary and sufficient conditions for the inclusion relation between $|A, p_n, \beta; \delta|_k$ (see [1]) and $|B, p_n, \beta; \delta|_k$ summability methods is introduced. Also, some known results are deduced from this theorem.

REFERENCES

- [1] H. S. Özarslan and A. Karakaş, A new study on absolute summability factors of infinite series, Maejo Int. J. Sci. Technol., 13, 3, pp.257-265 (2019).

(Hikmet Seyhan ÖZARSLAN) DEPARTMENT OF MATHEMATICS, ERCIYES UNIVERSITY, 38039 KAYSERİ, TURKEY

Email address: seyhan@erciyes.edu.tr

(Bağdagül KARTAL) DEPARTMENT OF MATHEMATICS, ERCIYES UNIVERSITY, 38039 KAYSERİ, TURKEY

Email address: bagdagulkartal@erciyes.edu.tr

Date: July, 8, 2023.

2020 Mathematics Subject Classification. 40D25, 40F05; 40G99.

Key words and phrases. Relative strength, Absolute matrix summability, Infinite series.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 27-28

ON INFRA FUZZY-SOFT TOPOLOGICAL SPACES

ARIFE ATAY

0000-0002-3373-8699

ABSTRACT

It is always interesting to obtain structures that retain some topological properties but have a weaker condition. In this study, we will introduce a topological structure that is not closed under arbitrary combination and is a subfamily of the family of fuzzy soft sets. Firstly we will give definitions of this subfamily. The basic properties of this space, which we will call infra-fuzzy soft topological spaces, will be investigated. We will show that the union of infra fuzzy-soft topological spaces is not a infra fuzzy-soft topological space. In the upcoming work we will examine the equivalents of some topological concepts in infra-fuzzy-soft topological spaces.

REFERENCES

- [1] D. Molodtsov, "Soft set theory—first results," *Computers & Mathematics with Applications*, vol. 37, no. 4-5, pp. 19–31, (1999). DOI:10.1016/S0898-1221(99)00056-5.
- [2] J. Yang and Y. Yao, "Semantics of soft sets and three-way decision with soft sets," *Knowledge-Based Systems*, vol. 194, article 105538, (2020). DOI: 10.1016/j.knosys.2020.105538.
- [3] N. Çağman and S. Enginoğlu, "Soft matrix theory and its decision making," *Computers and Mathematics with Applications*, vol. 59, no. 10, pp. 3308–3314, (2010). DOI:10.1016/j.camwa.2010.03.015.
- [4] M. K. El-Bably and A. A. El Atik, "Soft β -rough sets and their application to determine COVID-19," *Turkish Journal of Mathematics*, vol. 45, no. 3, pp. 1133–1148, (2021). DOI: 10.3906/mat-2008-93.
- [5] P. K. Maji, R. Biswas, and R. Roy, "Soft set theory," *Computers & Mathematics with Applications*, vol. 45, no. 4-5, pp. 555–562, (2003). DOI:10.1016/S0898-1221(03)00016-6.
- [6] L. A. Zadeh, Fuzzy sets, *Inform. Control*, vol. 8, pp. 338-353, (1965). DOI:10.1016/S0019-9958(65)90241-X.
- [7] C. L. Chang, Fuzzy topological spaces, *J. Math. Appl.*, vol. 24, pp. 182-193, (1968). DOI:10.1016/0022-247X(68)90057-7.
- [8] R. Lowen, Fuzzy topological spaces and fuzzy compactness, *J. Math. Anal. Appl.*, vol. 56, pp. 621-633, (1976). DOI:10.1016/0022-247X(76)90029-9.
- [9] P. K. Maji, R. Biswas, A. R. Roy, Fuzzy soft sets, *J. Fuzzy Math.*, vol. 9, pp. 589-602, (2001).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 54A05, 54A40.

Key words and phrases. Fuzzy soft set, Infra topology, Fuzzy soft topology.

- [10] B. Ahmat, A. Kharal, On fuzzy soft sets, *Adv. Fuzzy Syst.*, vol. 2009, pp. 586507, (2009). DOI:10.1155/2009/586507.
- [11] B. Tanay, M. B. Kandemir, Topological structures of fuzzy soft sets, *Comput. Math. Appl.*, vol. 61, pp. 412-418, (2011). DOI:10.1016/j.camwa.2011.03.056.
- [12] B. P. Varol, H. Aygün, Fuzzy soft topology, *Erzincan J. Math. Stat.*, vol. 41, pp. 407-419, (2012).
- [13] T. Şimşekler, S. Yüksel, Fuzzy soft topological spaces, *Ann. Fuzzy Math. Inform.*, vol. 5, pp. 87-96, (2013).
- [14] T. M. Al-shami, "New soft structure: infra soft topological spaces," *Mathematical Problems in Engineering*, vol. 2021, Article ID 3361604, 12 pages, (2021).
- [15] T. M. Al-shami, "Infra soft compact spaces and application to fixed point theorem," *Journal of Function Spaces*, vol. 2021, Article ID 3417096, 9 pages, (2021).
- [16] T. M. Al-shami and E. A. Abo-Tabl, "Connectedness and local connectedness on infra soft topological spaces," *Mathematics*, vol. 9, no. 15, (2021).
- [17] T. M. Al-shami, "New Soft Structure: Infra Soft Topological Spaces", *Mathematical Problems in Engineering*, vol. 2021, 12 pages, (2021). DOI: 10.1155/2021/3361604.
- [18] Zanyar A. Ameen, T. M. Al-shami, A. A. Azzam and Abdelwaheb Mhemdi, "A Novel Fuzzy Structure: Infra Fuzzy Topological Spaces", *Journal of Function Spaces*, vol. 2022, 11 pages, (2022). DOI:10.1155/2022/9778069.

DICLE UNIVERSITY, MATHEMATICS DEPARTMENT, 21280, DIYARBAKIR, TÜRKIYE
Email address: arifea@dicle.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 29

ON DERIVATIONS OF FREE BICOMMUTATIVE ALGEBRAS

ŞEHMUS FINDIK

0000-0001-5717-4413

ABSTRACT

Objects

* Identities defined as $(x_1x_2)x_3 = (x_1x_3)x_2$ and $x_1(x_2x_3) = x_2(x_1x_3)$ are called right symmetry and left symmetry, respectively.

* An algebra satisfying both right and left symmetries is called bicommutative.

* A nilpotent linear derivation δ of a bicommutative algebra F is called a Weitzenböck derivation. The set $F^\delta = \{u \in F : \delta(u) = 0\}$ is a subalgebra of F called the algebra of constants of the derivation δ .

* We assume that $F_{2n} = \langle x_1, y_1, \dots, x_n, y_n \rangle$ is the free bicommutative algebra of rank $2n$ over a field of characteristic zero, and δ_{2n} is its Weitzenböck derivation such that $\delta_{2n}(y_i) = x_i$, $\delta_{2n}(x_i) = 0$, for each $i \in \{1, \dots, n\}$.

Objectives

* We study the algebra $F_{2n}^{\delta_{2n}}$ of constants of δ_{2n} , and provide a generating set of this algebra.

REFERENCES

- [1] A. Nowicki, Polynomial Derivations and Their Rings of Constants, Uniwersytet Mikolaja Kopernika, Torun, (1994).
- [2] R. Weitzenböck, Über die Invarianten von linearen Gruppen, Acta Math, 58, 231-293 (1932).

DEPARTMENT OF MATHEMATICS, ÇUKUROVA UNIVERSITY, 01330, ADANA, TÜRKİYE
Email address: sfindik@cu.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 15A72, 17A36, 17A50.

Key words and phrases. Bicommutative algebra, Derivation.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 30-31

GENERALIZATION OF ALMOST PRIMARY AND NILARY IDEALS IN NONCOMMUTATIVE RINGS

ALAA ABOUHALAKA

0000-0002-5818-8064

ABSTRACT

In this paper we review works done on [4]. We extend the concept of almost primary ideals from commutative rings to noncommutative rings by introducing the notion of almost right primary ideals. We generalize the notion of nilary ideals in [7], and investigate various characteristics and properties that are specific to these ideals. Furthermore, we analyze rings in which every ideal can be classified as an almost right primary ideal (or an almost nilary ideal). Specifically, we identify the key properties of decomposable rings in which every ideal can be categorized as an almost right primary ideal (or an almost nilary ideal).

REFERENCES

- [1] A. Abouhalaka, A Class of Ideals in Noncommutative Rings , IFSCOM2022, Mersin, Turkey, (2022).
- [2] A. Abouhalaka, Ş. Findık, Almost prime ideals in noncommutative rings, *Serdica Math. J.* 48, 235–246, (2022).
- [3] A. Abouhalaka, Ş. Findık, Almost prime ideals of S-unital and local rings, arXiv::2204.04886.
- [4] A. Abouhalaka, Ş. Findık, Extension of Almost Primary Ideals to Noncommutative Rings and the Generalization of Nilary Ideals. *Mathematics*, 11(8):1917, (2023).
- [5] A. Ashour, M. Hamoda, Characterization of weakly primary ideals over non-commutative rings, *Int. Math Forum*, 9, (34) 1659 - 1667, (2014).
- [6] C. Gorton, H. E. Heatherly, Generalized primary rings and ideals, PhD dissertation, University of Louisiana, (2006).
- [7] G. F. Birkenmeier, J. Y. Kim and J. K. Park, Right primary and nilary rings and ideals, *Journal of Algebra*, 378, 133–152, (2013).
- [8] R. P. Dilworth, Noncommutative residuated lattices, *Trans. Amer. Math. Soc.*, 46, 426-444, (1939).
- [9] S. E. Atani and F. Farzalipour. On weakly primary ideals, *Georgian Math. J.*, 12, 3, 423–429, (2005).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 16N60, 16W99.

Key words and phrases. Almost right primary ideals, Almost nilary ideals, Noncommutative rings.

ÇUKUROVA UNIVERSITY, MATHEMATICS DEPARTMENT, 01330 BALIKLI, ADANA, TURKEY
Email address, Alaa Abouhalaka: alaa1aclids@gmail.com

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 32-33

LOCAL LOWER SEPARATION AXIOMS IN Q -REFLEXIVE SPACES

SAMED ÖZKAN

0000-0003-3063-6168

ABSTRACT

Several authors have extended the classical separation axioms of topology to topological categories. In 1991, these axioms were extended to an arbitrary set-based topological category by Baran [5] in terms of initial, final structures and discreteness. He defined the separation axioms first locally and then point free.

The development of lattice theory has led to the study of various mathematical frameworks using lattice structures, including lattice-valued topology [4], quantale-valued approach space [2, 7], quantale-valued metric space [3], lattice-valued pre-ordered space [4]. This encourages us to research local separation axioms in quantale-valued reflexive spaces, a generalization of quantale-valued preordered spaces [9].

In this paper, we first introduce the category **Q-RRel** consisting of quantale-valued reflexive spaces and Q -monotone mappings, which is a normalized topological category over **Set**, the category of sets and functions. Additionally, we characterize each of the local T_i , $i = 0, 1, 2$, and $PreT_2$ Q -reflexive spaces and investigate the relationships among them.

REFERENCES

- [1] D. Hofmann, G.J. Seal and W. Tholen, *Monoidal Topology: A Categorical Approach to Order, Metric, and Topology*, Cambridge University Press, (2014).
- [2] G. Jäger and W. Yao, Quantale-valued gauge spaces, *Iranian Journal of Fuzzy Systems*, 15(1), 103–122 (2018).
<https://doi.org/10.22111/IJFS.2018.3581>
- [3] G. Jäger, The Wijsman structure of a quantale-valued metric space, *Iranian Journal of Fuzzy Systems*, 17(1), 171–184 (2020).
<https://doi.org/10.22111/IJFS.2020.5118>

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 54B30; 54A05, 54D10, 18F75.

Key words and phrases. Quantale-valued reflexive space, Topological category, Pre-Hausdorff, Local separation.

- [4] J.T. Denniston, A. Melton, S.E. Rodabaugh and S.A. Selovyc, Lattice-valued preordered sets as lattice-valued topological systems, *Fuzzy Sets and Systems*, 259, 89–110 (2015).
<https://doi.org/10.1016/j.fss.2014.04.022>
- [5] M. Baran, Separation properties, *Indian Journal of Pure and Applied Mathematics*, 23(5), 333–341 (1991).
- [6] M. Baran, Generalized local separation properties, *Indian Journal of Pure and Applied Mathematics*, 25(6), 615–620 (1994).
- [7] M. Qasim and S. Özkan, The notion of closedness and D -connectedness in quantale-valued approach spaces, *Categories and General Algebraic Structures with Applications*, 12(1), 149–173 (2020).
<https://doi.org/10.29252/CGASA.12.1.149>
- [8] R.C. Flagg, Quantales and continuity spaces, *Algebra Universalis*, 37(3), 257–276 (1997).
<https://doi.org/10.1007/s000120050018>
- [9] S. Özkan and M. Qasim, Zero-Dimensionality and Hausdorffness in Quantale-Valued Preordered Spaces, *Filomat*, 36(7), 2311–2323 (2022).
<https://doi.org/10.2298/FIL2207311O>
- [10] S. Özkan, Local separation, closedness and zero-dimensionality in quantale-valued reflexive spaces, *Filomat*, 37(12), 3891–3905 (2023).
<https://doi.org/10.2298/FIL2312891O>

NEVŞEHİR HACI BEKTAŞ VELİ UNIVERSITY, DEPARTMENT OF MATHEMATICS, NEVŞEHİR, TÜRKİYE
Email address: ozkans@nevsehir.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 34

INVARIANT ALGEBRAS IN POLYNOMIAL RINGS

NAZAR ŞAHİN ÖĞÜŞLÜ

0000-0001-7407-9178

ABSTRACT

It is well known that the algebra of invariants of a finite group in the polynomial algebra of finite rank is of a finite generation set. In this talk, we handle some concrete subgroups of the symmetric group, and investigate generating sets for their invariant algebras in polynomial rings of low rank.

REFERENCES

- [1] E. Noether, Der endlichkeitssatz der invarianten endlicher gruppen, *Mathematische Annalen*, 77, 1, 89-92 (1915). <https://doi.org/10.1007/BF01456821>

DEPARTMENT OF MATHEMATICS, ÇUKUROVA UNIVERSITY, 01330, ADANA, TÜRKİYE
Email address: noguslu@cu.edu.tr

Date: July, 8, 2023.
2000 Mathematics Subject Classification. 13A50.
Key words and phrases. Invariant, Polynomial.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 35

AN ACTION OF DIHEDRAL GROUP

NAZAR ŞAHİN ÖĞÜŞLÜ

0000-0001-7407-9178

ABSTRACT

Classical invariant theoretical studies were started by the fourteenth problem of Hilbert asking the number of minimal generators of the algebra induced by the action of subgroups of the general linear group on the commutative associative unital algebra of finite rank. In the current work, we discuss the dihedral group action and provide an explicit generating set.

REFERENCES

- [1] D. Hilbert, *Mathematische Probleme*, Göttinger Nachrichten, 253-297 (1900); *Arch. Math. u. Phys.*, 3(1), 44-63 (1901); Translation: *Bull. Amer. Math. Soc.*, 8(10), 437-479 (1902).

DEPARTMENT OF MATHEMATICS, ÇUKUROVA UNIVERSITY, 01330, ADANA, TÜRKİYE
Email address: noguslu@cu.edu.tr

Date: July, 8, 2023.
2000 Mathematics Subject Classification. 13A50.
Key words and phrases. Invariant, Commutative algebra.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 36-37

AN ALMOST UNBIASED RIDGE ESTIMATOR IN BETA REGRESSION

YASIN ASAR

0000-0003-1109-8456

ABSTRACT

In this paper we introduced an almost unbiased beta ridge estimator to overcome the problem of multicollinearity in the beta regression model. The proposed estimator is based on the well-known ridge estimator and its extension to the beta regression model. Although, the beta ridge estimator is useful in the presence of ill-conditioned data matrices, it has large bias. Thus, it is reasonable to propose an almost unbiased ridge type estimator in beta regression. An extensive Monte Carlo simulation study is performed to compare the performance of the proposed almost unbiased beta ridge estimator to beta ridge estimator and the maximum likelihood estimator. According to the results of the simulation study, almost unbiased beta ridge estimator has lower mean squared error and squared bias values for certain scenarios.

REFERENCES

- [1] S. Ferrari, F. Cribari-Neto, Beta regression for modelling rates and proportions, *Journal of applied statistics*, 31(7), 799–815 (2004).
- [2] A. E. Hoerl, R. W. Kennard, Ridge regression: Biased estimation for non-orthogonal problems. *Technometrics* 12(1), 55–67 (1970a).
- [3] E. O. Ogundimu, G. S. Collins, Predictive performance of penalized beta regression model for continuous bounded outcomes, *Journal of Applied Statistics*, 45(6), 1030–1040 (2018).
- [4] M. Qasim, K. Månsson, B. M. G. Kibria, On some beta ridge regression estimators: method, simulation and application, *Journal of Statistical Computation and Simulation*, 91 (9), 1699–1712 (2021).
- [5] P. L. Espinheira, S. L. Ferrari, F. Cribari-Neto, On beta regression residuals, *Journal of Applied Statistics*, 35(4), 407–419 (2008).
- [6] J. W. Xu, H. Yang, More on the bias and variance comparisons of the restricted almost unbiased estimators, *Communication in Statistics-Theory and Methods*, 40, 4053–4064 (2011).
- [7] B. Singh, Y. P. Chaubey, T. D. Dwivedi, An almost unbiased ridge estimator, *Sankhya: The Indian Journal of Statistics, Series B*, 342–346 (1986).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 62J02; 62J07.

Key words and phrases. Beta regression, Ridge estimator, Almost unbiased, Maximum likelihood method, Multicollinearity.

- [8] G. C. McDonald, D. I. Galarneau, A Monte Carlo evaluation of some ridge-type estimators, *Journal of the American Statistical Association*, 70(350), 407–413 (1975).
- [9] M. Erişođlu, N. Yaman, Ridge Tahminine Dayalı Kuvvetli Regresyon Analizinde Yanlılık Parametresi Tahminlerinin Performanslarının Karşılaştırılması, *NEF Journal of Science and Engineering*, 1(2), 103–111 (2019).
- [10] B. M. G. Kibria, Performance of some new ridge regression estimators, *Communications in Statistics-Simulation and Computation*, 32(2), 419–435 (2003).
- [11] R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.

NECMETTİN ERBAKAN ÜNİVERSİTESİ, DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCES,
42090, KONYA, TURKEY
Email address: yas.erc@erbakan.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 38

**REVOLUTIONIZING MATRIX COMPUTATIONS: A PRACTICAL
APPROACH FOR EFFICIENT CALCULATION OF MATRIX
SIGN FUNCTION**

GUL KARADUMAN

ABSTRACT

Matrix computations are fundamental operations in numerous scientific and engineering fields, such as machine learning, quantum mechanics, and numerical analysis. Calculating the matrix sign function, which determines the sign of each entry in a matrix, is of great significance in these applications. However, efficiently computing the matrix sign function remains challenging, especially for large matrices. This study introduces a way to approximate the matrix sign function using the Taylor expansion and Generalized Minimal Residual (GMRES) algorithm. The proposed approach reduces the computational complexity and enhances the numerical stability, making it highly practical for a wide range of applications.

REFERENCES

- [1] R. L. Burden and J. D. Faires. Numerical Analysis. PWS-Kent Publishing Company, Boston, fourth edition, (1989).
- [2] J. W. Demmel. Applied Numerical Linear Algebra. Society for Industrial and Applied Mathematics, (1997).
- [3] E. D. Denman and A. N. Beavers. The matrix sign function and computations in systems. Applied Mathematics and Computation, 2(1):63-94, (1976).
- [4] N. J. Higham. Functions of Matrices. Society for Industrial and Applied Mathematics, (2008).
- [5] C. Kenney and A. J. Laub. Rational iterative methods for the matrix sign function. SIAM Journal on Matrix Analysis and Applications, 12(2):273-291, (1991).
- [6] C.S. Kenney and A.J. Laub. The matrix sign function. IEEE Transactions on Automatic Control, 40(8):1330-1348, (1995).
- [7] Y. Saad and M. H. Schultz. Gmres: A generalized minimal residual algorithm for solving nonsymmetric linear systems. SIAM Journal on Scientific and Statistical Computing, 7(3):856-869, (1986).

VOCATIONAL SCHOOL OF HEALTH SERVICES, KARAMANOGLU MEHMETBEY UNIVERSITY, KARAMAN, 70200, TURKEY
Email address: gulkb@bu.edu

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 65F10.

Key words and phrases. Matrix functions, Matrix sign function, Iterative methods, Taylor expansion, GMRES.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 39

**MULTIPLICATION RULES FOR POINTWISE INNER
AUTOMORPHISMS IN LIE ALGEBRAS**

ELA AYDIN

0000-0003-4867-0583

ABSTRACT

Let K be a field of characteristic zero, and $N_{m,c}$ be the free metabelian nilpotent of class c Lie algebra of rank m over K . In this talk, we consider the group of pointwise inner automorphisms of $N_{m,c}$, and establish multiplication rules in this group for low nilpotency classes c and ranks m .

REFERENCES

- [1] G. Endimioni, Pointwise inner automorphisms in a free nilpotent group, Quarterly Journal of Mathematics, 53, 4, 397-402 (2002).
- [2] Ş. Fındık, Normal and normally outer automorphisms of free metabelian nilpotent Lie algebras, Serdica Mathematical Journal, 35, 2, 171-210 (2010).

DEPARTMENT OF MATHEMATICS, ÇUKUROVA UNIVERSITY, 01330, ADANA, TÜRKİYE
Email address: eyadin@cu.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 17B01;17B30;17B40.

Key words and phrases. Automorphisms, Metabelian, Nilpotent.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 40-41

EXACT SOLUTION OF THE SCHRÖDINGER EQUATION IN TOPOLOGICALLY MASSIVE SPACETIME

ALI TARSUSLU AND KENAN SOGUT

ABSTRACT. We study exact solutions of the Schrödinger equation in a topologically massive space-time. Exact solutions are obtained in terms of the hypergeometric functions. We also obtained the momentum quantization with the help of the condition of the wave function to be bounded. The investigation is performed in the framework of rainbow formalism of the General Relativity Theory (RGT). The quantized momentum is evaluated for different choices of the rainbow functions.

REFERENCES

- [1] V.M. Villalba, J. Math. Phys. 43, 4909,(2002).
- [2] V.M. Villalba, Int. J. Theor. Phys. 36, 1321, (1997).
- [3] J. Audretsch and G. Schafer, J. Phys. A: Math. Gen. 11, 1583, (1978).
- [4] G. Schafer and H. Dehnen, J. Phys. A: Math. Gen. 13, 517, (1980).
- [5] K.H. Lotze, Astrophys. Space Sci. 120, 191, (1986).
- [6] S. Biswas, Pramana 36, 519, (1991).
- [7] S. Haouat and R. Chekireb, Eur. Phys. J. C 72, 2034, (2012).
- [8] E.E. Kangal, H. Yanar, A. Havare and K. Sogut, Ann. Phys. 343, 40, (2014).
- [9] J. Magueijo J and L. Smolin, Phys. Rev. Lett. 88, 190403, (2002).
- [10] J. Magueijo J and L. Smolin, Phys. Rev.D 67, 044017, (2003).
- [11] J. Magueijo J and L. Smolin, Class. Quant. Grav. 21, 1725, (2004).
- [12] Aliev, A. N., Nutku, Y., and Saygili, K. "Topologically massive magnetic monopoles." Class. Quant. Grav., 17(19), 4111-4123, (2000).
- [13] Q. Exirifard and E. Karimi, International Journal of Modern Physics D Vol. 31, No. 3, 2250018, (2022).
- [14] D. Brill and J. Wheeler, Interaction of Neutrinos and Gravitational Fields, Rev. Mod. Phys. 29, 465, (1957).
- [15] M. Abramowitz and I. Stegun, "Handbook of Mathematical Functions with Formulas, Graphs and Mathematical Tables", Dover Publications Inc., New York (1965).
- [16] S.H. Hendi, et al., Eur. Phys. J. C 76, 296, (2016) .
- [17] Z.W. Feng and S. Z. Yang, Phys. Lett. B 772, 737, (2017).
- [18] C.Z. Liu and J. Y. Zhu, Gen. Rel. Grav. 40, 1899, (2008).
- [19] C. Leiva, J. Saavedra and J. Villanueva, Mod. Phys. Lett. A 24(18), 1443, (2009).
- [20] Z. Amirabi, M. Halilsoy and S. H. Mazharimousavi, Mod. Phys. Lett. A 33(9), 1850049, (2018).

Date: July, 8, 2023.

Key words and phrases. Schrödinger equation, Exact solution, Topologically massive space-time, Rainbow formalism.

(Ali Tarsuslu) MERSIN UNIVERSITY, PHYSICS DEPARTMENT, 33343, MERSIN, TURKEY
Email address: alitarsuslu@gmail.com

(Kenan Sogut) MERSIN UNIVERSITY, PHYSICS DEPARTMENT, 33343, MERSIN, TURKEY
Email address: kenansogut@gmail.com

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 42-43

AN APPLICATION OF CONTROLLED SETS IN MEDICAL DIAGNOSIS

SİNEM TARSUSLU(YILMAZ) AND GÖKHAN ÇUVALCIOĞLU

0000-0001-9192-7001 and 0000-0001-5451-3336

ABSTRACT

Fuzzy set introduced by Zadeh as an extension of crisp sets in 1965[11]. Several generalization of fuzzy sets The intuitionistic fuzzy set concept was defined by Atanassov in 1983 [1] as an extension of fuzzy sets by enlarging the truth value set to the lattice $[0, 1] \times [0, 1]$. Intuitionistic fuzzy sets have different application areas such as logical programming, machine learning, decision making problems. Medical diagnostic applications have studied in intuitionistic fuzzy sets with different approaches, as distance measure, similarity measure etc [7, 8, 9, 10]. In this study, controlled sets were applied to medical diagnosis. The results obtained with using the smallest distance were compared with the results of previous studies.

REFERENCES

- [1] Atanassov K.T., Intuitionistic Fuzzy Sets, VII ITKR.s Session, Sofia, June (1983).
- [2] Atanassov K.T., Studies in Fuzziness and Soft Computing-On Intuitionistic Fuzzy Sets Theory, ISBN 978-3-642-29126-5, Springer Heidelberg, New York(2012).
- [3] Çuvalcıoğlu G., Controlled Set Theory, Bogolyubov Readings DIF-2013, Ukraine, p.342, (2013).
- [4] Çuvalcıoğlu G., Some Properties of Controlled Set Theory, Notes on IFSs, 20(2), 37-42, (2014).
- [5] Çuvalcıoğlu G., Varol S. U., Decision Making Process For Serving Restaurants Using Intuitionistic Fuzzy Set Theory Via Controlled Sets, Journal of Universal Mathematics, 4(2), 296-325, (2021).
- [6] De S.K., Biswas R., Roy A.R., An Application of Intuitionistic Fuzzy Sets in Medical Diagnosis, Fuzzy Sets and Systems, 117, 209-213, (2001).
- [7] Luo M., Zhao R., A Distance Measure Between Intuitionistic Fuzzy Sets and Its Application in Medical Diagnosis, Artificial Intelligence in Medicine, 89, 34-39, (2018).
- [8] Song Y., Wang X., Quan W., Huang W., A new approach to construct similarity measure for intuitionistic fuzzy sets, Soft Comput, 23, 1985-1998, (2019).
- [9] Szmıd E., Kacprzyk J., Distances Between Intuitionistic Fuzzy Sets, Fuzzy Sets and Systems, 114(3), 505-518, (2000).

Date: July, 8, 2023.

2010 Mathematics Subject Classification. 03E72,08A72.

Key words and phrases. Controlled sets, Intuitionistic fuzzy sets, Medical diagnosis.

- [10] Szmidt E., Kacprzyk J., Intuitionistic Fuzzy Sets in Some Medical Applications, Fifth Int. Conf. on IFSs, Sofia, 22-23 Sept. 2001 NIFS 7(1), 58-64, (2001).
- [11] Zadeh L.A., Fuzzy Sets, Information and Control, 8, 338-353, (1965).

(Sinem Tarsuslu(Yılmaz)) DEPARTMENT OF NATURAL AND MATHEMATICAL SCIENCES, FACULTY OF ENGINEERING, TARSUS UNIVERSITY, 33100, TARSUS, TURKEY.
Email address: sinemtarsuslu@tarsus.edu.tr

(Gökhan Çuvalcıoğlu) DEPARTMENT OF MATHEMATICS, FACULTY OF ARTS AND SCIENCES, MERSIN UNIVERSITY, MERSIN, TURKEY
Email address: gcuvalcioglu@gmail.com

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 44-45

ON TRANSLATION SURFACES

BEYHAN YILMAZ AND A. HAS

0000-0002-5091-3487 and 0000-0003-0658-9365

ABSTRACT

In this article, generating curves of translation surfaces are paired with some special curve pairs. With the results obtained from these pairings, the developable and minimal translation surfaces are characterized. In addition, the surface curvatures of the translation surface are obtained. For a better understanding of the results, examples are given and their drawings are made with the help of Mathematica.

REFERENCES

- [1] J.M. Bertrand, Mémoire sur la théorie des courbes à double courbure. Comptes Rendus 15, 332–350 (1850).
- [2] A. Mannheim, De l'emploi de la courbe représentative de la surface des normales principales d'une courbe gauche pour la démonstration de propriétés relatives à cette courbure, Comptes Rendus des Séances de l'Académie des Sciences, 86, 1254-1256 (1878).
- [3] M.P. Do Carmo, Differential Geometry of Curves and Surfaces, Prentice-Hall, New Jersey, (1976).
- [4] S. Perez Diaz, L. Shen, Parameterization of rational translational surfaces, Theoretical Computer Science, 835, 156-167 (2020).
- [5] L. Verstraelen, J. Walrave, S. Yaprak, The minimal translation surfaces in Euclidean space, Soochow Journal of Mathematics, 20, 77-82 (1994).
- [6] H.L. Liu, Translation surfaces with constant mean curvature in 3-dimensional spaces, Journal of Geometry, 64, 141-149 (1999).
- [7] M. Munteanu, A.I. Nistor, On the geometry of the second fundamental form of translation surfaces in E^3 , Houston J. Math., 37(4), 1087-1102 (2011).
- [8] Y. Yuan, H.L. Liu, Some New Translation Surfaces in 3-Minkowski Space, Journal of Math. Res. and Exp., 31(6), 1123-1128 (2011).
- [9] M.E. Aydın, M.A. Kulahcı, A.O. Oğrenmis, Constant curvature translation surfaces in Galilean 3-space, International Electronic Journal of Geometry, 12(1), 9-19 (2019).
- [10] Struik DJ. Lectures on classical differential geometry, Dover Publications, New York, (1988).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 53A04, 53A05.

Key words and phrases. Translation surface, Bertrand curves, Mannheim curves, Involute-evolute curves.

(B. Yılmaz) KAHRAMANMARAŞ SÜTÇÜ İMAM UNIVERSITY, DEPARTMENT OF MATHEMATICS, FACULTY OF SCIENCE, 46100, KAHRAMANMARAŞ, TURKEY
Email address, B. Yılmaz: beyhanyilmaz@ksu.edu.tr

(A. Has) KAHRAMANMARAŞ SÜTÇÜ İMAM UNIVERSITY, DEPARTMENT OF MATHEMATICS, FACULTY OF SCIENCE, 46100, KAHRAMANMARAŞ, TURKEY
Email address, A. Has: ahas@ksu.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 46

COMPLEX MATRIX VERSION OF HYBRID NUMBERS

Ç. RAMİS AND Y. YAZLIK

ABSTRACT

Dual complex and hyperbolic number systems are combined to generate the hybrid number system in four dimensional space \mathbb{E}_2^4 [3]. In this study, we transform hybrid numbers into a new form and define a linear transformation over complex matrices. The characteristics of complex matrix representation are examined and their algebraic properties are derived.

REFERENCES

- [1] A. A. Harkin and J. B. Harkin, Geometry of generalized complex number, Mathematics magazine, Vol.77(2), pp.118-129 (2004).
<https://doi.org/10.1080/0025570X.2004.11953236>
- [2] F. Zhang, Quaternions and matrices of quaternions, Linear algebra and its applications, Vol.251, pp.21-57 (1997).
[https://doi.org/10.1016/0024-3795\(95\)00543-9](https://doi.org/10.1016/0024-3795(95)00543-9)
- [3] M. Özdemir, Introduction to hybrid numbers, Adv. Appl. Clifford Algebras, Vol.28, pp.1-32 (2018).
<https://doi.org/10.1007/s00006-018-0833-3>

(Ç. Ramis) NEVŞEHİR HACI BEKTAŞ VELİ UNIVERSITY, DEPARTMENT OF MATHEMATICS, 50300, NEVŞEHİR, TURKEY

Email address: cramis@nevsehir.edu.tr

(Y. Yazlık) NEVŞEHİR HACI BEKTAŞ VELİ UNIVERSITY, DEPARTMENT OF MATHEMATICS, 50300, NEVŞEHİR, TURKEY

Email address: yyazlik@nevsehir.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 15A33, 53A35; 15A57, 53Z05.

Key words and phrases. Hybrid number, Dual number, Hyperbolic number, Complex matrix.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 47-48

**APPROXIMATE SOLUTIONS OF THE MODIFIED KRATZER
POTENTIAL PLUS SCREENED COULOMB POTENTIAL IN
N-DIMENSIONS**

A. ÖZFİDAN

ABSTRACT

We investigate the bound state solutions of the N-dimensional Klein-Gordon equation with the modified Kratzer potential plus screened Coulomb potential via the asymptotic iteration approach. By the use of Greene-Aldrich approximation, we construct the N-dimensional energy spectrum and the N-dimensional radial wavefunction in relativistic theory. To test the accuracy of our analytical approach, we compare the present results with other reported works.

REFERENCES

- [1] A.I., Ahmadov, S.M., Aslanova, M.S., Orujova, S.V., Badalov, S.H., Dong, Approximate bound state solutions of the Klein-Gordon equation with the linear combination of Hulthen and Yukawa potentials, *Physics Letters A*, vol. 383, pp. 3010, (2019).
- [2] K.R., Purohit, R.H., Parmar, A.K., Rai, Eigensolution and various properties of the screened cosine Kratzer potential in D dimensions via relativistic and non-relativistic treatment, *European Physical Journal Plus*, vol. 135, (2020).
- [3] C.P., Onyenegecha, A.I., Opara, I.J., Njoku, S.C., Udensi, U.M., Ukwuihe, C.J., Okereke, A., Omame, Analytical solutions of D-dimensional Klein-Gordon equation with modified Mobius squared potential, *Results in Physics*, vol. 25, pp. 104144 (2021).
- [4] C.E., Edet, U.S., Okorie, A.T., Ngiangia, A.N., Ikot, Bound-state solutions of the Schrödinger for the modified Kratzer potential plus screened Coulomb potential, *Indian Journal of Physics*, vol. 94, pp. 425 (2020).
- [5] A., Kratzer, Die ultraroten rotationsspektren der halogenwasserstoffe, *Zeitschrift für Physik*, vol. 3, pp. 289, (1920).
- [6] K.J., Oyewumi, Realization of the spectrum generating algebra for the generalized Kratzer potentials, *International Journal of Theoretical Physics*, vol. 49, pp. 1302, (2010).
- [7] A., Durmuş, Non-relativistic treatment of diatomic molecules interacting with a generalized Kratzer potential in hyperspherical coordinates, *Journal of Physics A: Mathematical and Theoretical*, vol. 44, pp. 155205, (2007).
- [8] H., Yukawa, On the interaction of elementary particles I, *Proceedings of the Physico-Mathematical Society of Japan 3rd Series*, vol. 17, pp. 48, (1935).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 81Q05; 33C05.

Key words and phrases. Asymptotic iteration method, Hyperspherical coordinates.

- [9] J.D., Louck, W.H., Shaffer, Generalized orbital angular momentum and the n-fold degenerate quantum mechanical oscillator: Part I the twofold degenerate oscillator, *Journal of Molecular Spectroscopy*, vol. 4, pp. 285, (1960).
- [10] J.D., Louck, Generalized orbital angular momentum and the n-fold degenerate quantum mechanical oscillator: Part II the n-fold degenerate oscillator, *Journal of Molecular Spectroscopy*, vol. 4, pp. 298, (1960).
- [11] J.D., Louck, Generalized orbital angular momentum and the n-fold degenerate quantum mechanical oscillator: Part III radial integrals, *Journal of Molecular Spectroscopy*, vol. 4, pp. 334, (1960).
- [12] A., Chatterjee, Large-N expansions in quantum mechanics, atomic physics and some O(N) invariant systems, *Physics Reports*, vol. 186, pp. 249, (1990).
- [13] R. L., Greene, C., Aldrich, Variational wave functions for a screened Coulomb potential, *Physical Review A*, vol. 14, pp. 2363, (1976).
- [14] H., Ciftci, R.L., Hall, N., Saad, Asymptotic iteration method for eigenvalue problems, *Journal of Physics A: Mathematical and General*, vol. 36, pp. 11807, (2003).
- [15] H., Ciftci, R.L., Hall, N., Saad, Construction of exact solutions to eigenvalue problems by the asymptotic iteration method, *Journal of Physics A: Mathematical and General*, vol. 38, pp. 1147, (2005).
- [16] H., Ciftci, R.L., Hall, N., Saad, Iterative solutions to the Dirac equation, *Physical Review A*, vol. 72, pp. 022301, (2005).
- [17] A.D., Amjadi, H., Bahlouli, A., Al-Hasan, Dirac and Klein-Gordon equations with equal scalar and vector potentials, *Physics Letters A*, vol. 349, pp. 87, (2006).

TARSUS UNIVERSITY, DEPARTMENT OF NATURAL AND MATHEMATICAL SCIENCES, MERSIN, TÜRKİYE.

Email address: ayselozfidan@tarsus.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 49

ON LEAP ZAGREB INDICES OF A SPECIAL GRAPH
OBTAINED BY SEMIGROUPS

YAŞAR NACAROĞLU

0000-0001-7179-0490

ABSTRACT

In 2013, Das et al. defined the monogenic semi-group graphs [1]. And, various topological indices of the monogenic semi-group graphs have been calculated so far [2, 3]. The aim of this study is to continue to create formulas for the topological indices of these special graphs. In this study, we give exact formulae for various the leap Zagreb indices of this special algebraic graph obtained from monogenic semi-groups.

REFERENCES

- [1] K.C. Das, N. Akgunes and A.S. Cevik, On a graph of monogenic semigroup, Journal of Ineq.and Appl., Vol.2013, (44), pp.1-13 (2013).
- [2] N. Akgüneş, K.C. Das, A.S. Çevik, Topological Indices on a Graph of Monogenic Semigroups; Gutman, I., Ed.; Topics in Chemical Graph Theory, Mathematical Chemistry Monographs; University of Kragujevac and Faculty of Science Kragujevac: Kragujevac, Serbia, (2014).
- [3] N. Akgunes, Y. Nacaroglu, On The Sigma Index of The Corona Products of Monogenic Semi-group Graphs, Journal of Universal Mathematics, Vol. 2(1), pp.68-74 (2019).

KAHRAMANMARAŞ SÜTÇÜ İMAM UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF MATHEMATICS, 46050, KAHRAMANMARAŞ, TÜRKİYE

Email address: yasarnacaroglu@ksu.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 05C12, 05C25, 05C10, 13M05, 20M14.

Key words and phrases. Topological indices, Leap Zagreb indices, Monogenic semi-group graphs.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 50

**APPROACH TO INTUITIONISTIC FUZZY SETS WITH
COMPARATIVE EXAMPLES OF DECISION MAKING
METHODS IN DIFFERENT FIELDS**

FERİD TUĞRUL, MEHMET ÇİTİL, AND GÖKHAN ÇUVALCIOĞLU

0000-0001-7690-8080, 0000-0003-3899-3434 and 0000-0001-5451-3336

ABSTRACT

Intuitionistic fuzzy sets are of interest to many researchers both in theory and in practice. Moreover, applications of decision making methods on intuitionistic fuzzy sets are popular research areas today and yield effective results. Recently, with the help of intuitionistic fuzzy sets, decision making applications are made in many areas such as education, engineering, medicine, personnel selection, etc. In this study has been investigated how intuitionistic fuzzy sets are used and benefitted from these sets in different application areas.

REFERENCES

- [1] K. T. Atanassov, Intuitionistic Fuzzy Sets, VII ITKR Session, Sofia, 20-23 June (1983), (Deposited in Centr. Sci.-Techn. Library of the Bulg. Acad. of Sci., 1697/84) (in Bulgarian). Reprinted: Int. J. Bioautomation 20(S1), 1-6, (2016).
- [2] G. Çuvalcıođlu, Some Properties of Controlled Set Theory, Notes on Intuitionistic Fuzzy Sets, 20(2), 37-42, (2014).
- [3] F. Tuđrul, M. Çitil, Application of Mathematical Modeling in Multi Criteria Decision Making Process: Intuitionistic Fuzzy PROMETHEE, Journal of Mathematical Sciences and Modelling, 5(2), 48-56, (2022).

DEPARTMENT OF MATHEMATICS, FACULTY OF SCIENCE, KAHRAMANMARAŞ SÜTCÜ İMAM UNIVERSITY, KAHRAMANMARAŞ, TÜRKİYE
Email address: feridetugrul@gmail.com, citil@ksu.edu.tr

DEPARTMENT OF MATHEMATICS, FACULTY OF SCIENCE, MERSİN UNIVERSITY, MERSİN, TÜRKİYE
Email address: gcuvalcioglu@mersin.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 03E72; 90B50.

Key words and phrases. Intuitionistic fuzzy sets, Controlled set.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 51

APPROXIMATION OF MAX-PRODUCT TRUNCATED BASKAKOV OPERATORS BY FUZZY NUMBERS

E. ACAR AND S. KIRCI SERENBAY

0000-0002-2517-5849 and 0000-0001-5819-9997

ABSTRACT

The main purpose of this paper is to use called Truncated Baskakov operator of max-product kind for approximating fuzzy numbers with continuous membership functions. We will show that these operators additionally maintain the quasi-concavity in a manner analogous to the specific case of the unit interval. These results turn out to be particularly useful in the approximation of fuzzy numbers since they will enable us to construct fuzzy numbers with the same support in a straightforward manner. Additionally, these operators provide a good order of approximation for the (non-degenerate) segment core.

REFERENCES

- [1] B. Bede, L. Coroianu and S.G. Gal , Approximation and Shape Preserving Properties of The Truncated Baskakov Operator of Max-Product Kind, Revista De La Unio Mathematica Argentina, Vol.52,N.1, pp.89-107 (2011).
- [2] B. Bede, L. Coroianu and S.G. Gal, Approximation by Max-Product Type Operators, Springer International Publishing,Switzerland (2016).
- [3] L. Coroianu , S.G. Gal and B. Bede ,Approximation of fuzzy numbers by max-product Bernstein operators,Fuzzy Sets and Systems 257,pp.41–66 (2014).

(Ecem Acar) HARRAN UNIVERSITY, DEPARTMENT OF MATHEMATICS AND SCIENCE EDUCATION,
63290, ŞANLIURFA, TURKEY

Email address: ecemkarakus33@gmail.com

(Sevilay Kirci Serenbay) HARRAN UNIVERSITY, DEPARTMENT OF MATHEMATICS, 63290, ŞANLIURFA,
TURKEY

Email address: sevilaykirci@gmail.com

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 41A10, 41A25, 41A36.

Key words and phrases. Fuzzy Numbers, Truncated Baskakov operators, Expected interval.

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

08-11 JULY 2023 TARSUS, MERSIN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 52-53

A METHOD FOR DECIDING APPLICABILITY OF BLOCKCHAIN IN AVIONICS SYSTEMS

AYŞENUR SAYIL AND HARUN ÇELİK

ABSTRACT

New threats are emerging every day for existing avionic systems that utilize centralized architectural structures. A security vulnerability in any avionic system poses a threat to data security, flight safety, crew safety, and privacy [1]. The centralized architecture of current systems used for air traffic control leaves aircraft vulnerable to various attacks. These attacks can result in aircraft hijacking, data manipulation, data deletion, and disruption of synchronized communication. Similarly, systems employing this centralized architecture struggle to effectively control the entire airspace when planning routes for swarm aerial vehicles [2]. Blockchain technology possesses the potential to offer solutions to these challenges with its decentralized structure. Blockchain technology can enhance avionic systems in terms of core services, promote information sharing, and provide a comprehensive data view to improve security and aircraft operability [3]. However, the use of blockchain is not necessary for every encountered problem, nor can the same type of blockchain resolve every problem. It is crucial to evaluate different types of blockchains, considering their pros, cons, and limitations, in order to select the most suitable type. At this point, understanding the specific needs that blockchain excels in meeting becomes imperative. This study proposes a method to comprehend the applicability of blockchain as a viable solution method. The ability to consider blockchain as an option while fulfilling the functions of the designed avionic system constitutes a fundamental component in determining whether blockchain usage is necessary for the problem. The initial steps of the proposed method involve a comprehensive understanding of the problem within the avionic system, conducting a thorough analysis of its structure, and clearly defining the system's functions. With this method, after establishing that blockchain can be considered as an option, different types of blockchains can be compared based on their advantages, disadvantages, and limitations to select the most suitable one.

Date: July, 8, 2023.

Key words and phrases. Blockchain, Avionics systems, Flight safety.

This study is jointly supported by Turkish Aerospace Industries, Inc. (TAI) and Erciyes University Scientific Research Projects Unit under Project Nu: FKA-2022-11017.

REFERENCES

- [1] Blasch, E., Xu, R., Chen, Y., Chen, G., & Shen, D. Blockchain methods for trusted avionics systems. In 2019 IEEE National Aerospace and Electronics Conference (NAECON) (pp. 192-199). IEEE, July, (2019).
- [2] García-Magariño, I., Lacuesta, R., Rajaraman, M., & Lloret, J. Security in networks of unmanned aerial vehicles for surveillance with an agent-based approach inspired by the principles of blockchain. *Ad Hoc Networks*, 86, 72-82, (2019).
- [3] Joshi, A. P., Han, M., & Wang, Y. A survey on security and privacy issues of blockchain technology. *Mathematical foundations of computing*, 1(2), (2018).

(Ayşenur SAYIL) ERCIYES UNIVERSITY, AUTONOMOUS AND INTELLIGENT SYSTEMS LAB., 38039, KAYSERİ, TÜRKİYE

Email address, Ayşenur SAYIL: aysenurctnkaya@gmail.com

(Harun ÇELİK) ERCIYES UNIVERSITY, DEPARTMENT OF ASTRONAUTICAL ENGINEERING, 38039, KAYSERİ, TÜRKİYE

Email address, Harun ÇELİK: haruncelik@erciyes.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 54

ON ISOLATED SUBSEMIGROUPS OF ORDER-DECREASING
TRANSFORMATION SEMIGROUPS

M.YAĞCI

ABSTRACT

For an arbitrary set X , the set \mathcal{T}_X of all transformations of X is a semigroup under composition, and called the full transformation semigroup on X . If $X = X_n = \{1, \dots, n\}$ with its natural order, then \mathcal{T}_X is denoted by \mathcal{T}_n . A transformation $\alpha \in \mathcal{T}_n$ is called order-decreasing if $x\alpha \leq x$ for each $x \in X_n$. The semigroup of all order-decreasing transformations in \mathcal{T}_n is denoted by \mathcal{D}_n . Let $E(\mathcal{D}_n)$ be the set of all idempotents in \mathcal{D}_n and for any $\xi \in E(\mathcal{D}_n)$, let

$$\mathcal{D}_n(\xi) = \{ \alpha \in \mathcal{D}_n : \alpha^m = \xi \text{ for some } m \in \mathbb{Z}^+ \}.$$

A subsemigroup T of a semigroup S is called isolated provided that for all $x \in S$, the condition $x^n \in T$ for some $n \in \mathbb{N}$ implies $x \in T$. In this talk we show that $\mathcal{D}_n(\xi)$ is the unique isolated nilpotent subsemigroup of \mathcal{D}_n .

REFERENCES

- [1] A. Umar, On the semigroups of order-decreasing finite full transformations, Proceedings of the Royal Society of Edinburgh, 120A, 129-142 (1992).
- [2] A. Umar, Semigroups of Order-Decreasing Transformations. Ph.D. Thesis, University of St Andrews, (1992).
- [3] E. Korkmaz, H. Ayık, Isolated subsemigroups of order-preserving and decreasing transformation semigroups, Bull. Malays. Math. Sci. Soc., 45, 663-675 (2022).
- [4] M. Yağcı, E. Korkmaz, On nilpotent subsemigroups of the order-preserving and decreasing transformation semigroups, Semigroup Forum, 101, 486-496 (2020).
- [5] M. Yağcı, E. Korkmaz, On elements of finite subsemigroups of order-preserving and decreasing transformations, Bull. Malays. Math. Sci. Soc., 43, 3863-3870 (2020).
- [6] M. Yağcı, On Nilpotent Subsemigroups of the Order-Decreasing Transformation Semigroups, Bull. Malays. Math. Sci. Soc., 46:53, (2023).
- [7] V. Mazorchuk, G.Tsyaputa, Isolated Subsemigroups in the variants of T_n , arxiv:math/0503489v2[math.GR] 30 Aug (2007).

SINOP UNIVERSITY, DEPARTMENT OF MATHEMATICS, 57000, SINOP, TURKEY
Email address: myagci@sinop.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 20M20.

Key words and phrases. Order-decreasing transformation, Nilpotent subsemigroup, Isolated subsemigroup.

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 55-56

**A NOVEL METHODOLOGICAL FRAMEWORK TO IDENTIFY
THE CRITERIA FOR DECISION-MAKING PROBLEMS IN
NEUTROSOPHIC FUZZY ENVIRONMENT**

Ö.F.GÖRÇÜN AND H. KÜÇÜKÖNDER

ABSTRACT

Identifying the suitable and appropriate criteria is a significant and critical step in structuring decision-making problems, as well-structured decision-making problems make it possible to produce effective and practical solutions. However, many scholars have adopted two approaches to identify the criteria. The first is to prefer to create criteria set based on the standards used in previous research, and the second is to identify the criteria by collecting experts' evaluations. Both approaches have some drawbacks and limitations. Some criteria presented by the previous works may have lost their actuality or may be less influential or entirely uninfluential. In addition, only focusing on the experts' evaluations to define the criteria may cause overlooking the knowledge accumulated about the subject through long ages in the literature. This paper adopted a mix including both approaches by keeping these gaps in mind. First, the criteria utilized in the previous studies are collected, and by handling them individually, experts evaluate the criteria. Besides, experts can also recommend adding new criteria not on the list in the first phase of the evaluation process. In this phase, the extension of the Delphi technique based on T2NFNs is proposed, as the evaluation process may incorporate many complicated predictable and unpredictable ambiguities. Also, the proposed model enables a complete consensus among experts at the end of the evaluation process. As a result, the developed model consists of the advantages of T2NFNs and the Delphi technique. The T2NFN-Delphi can capture and process uncertainties better than the Delphi approaches' traditional and fuzzy versions. Hence, the T2NFN extension strengthens the classical Delphi approach.

REFERENCES

- [1] S. Kaya, P. Kundu, Ö. F. Görçün, Evaluation of container port sustainability using WASPAS technique using on type-2 neutrosophic fuzzy numbers, Marine Pollution Bulletin, vol.190, 2023, pp.114849 (2023).
<https://doi.org/10.1016/j.marpolbul.2023.114849>

Date: July, 8, 2023.

Key words and phrases. Decision-making, Criteria identification, T2NFN sets, Delphi approach.

- [2] Bazrafshan. R, Hashemkhani. Z, Al-E-hashem. S. Comparison of the sub-tour elimination methods for the asymmetric traveling salesman problem applying the SECA method, *Axioms*, vol.10, N.1, 2023, pp.1-14 (2021).
<https://doi.org/10.3390/axioms10010019>
- [3] M. Abdel-Basset, M. Saleh, A. Gamal, F. Smarandache, An approach of TOPSIS technique for developing supplier selection with group decision making under type-2 neutrosophic number, *Applied Soft Computing Journal*, vol. 7, pp.438–452. (2019).
<https://doi.org/10.1016/j.asoc.2019.01.035>
- [4] F. Smarandache, Neutrosophic neutrosophic probability, set, and logic: analytic synthesis & synthetic analysis, American Research Press, New York, (1998).
- [5] Tiwari. R, Kumar. R, A framework for prioritizing cloud services in neutrosophic environment, *Journal of King Saud University - Computer and Information Sciences*, vol. 34, N. 6, pp. 3151–3166, (2020).
<https://doi.org/10.1016/j.jksuci.2020.05.009>
- [6] S. H. Zolfani, Ö. F. Görçün, M. Çanakçıoğlu, E. B. Tirkolaee, (2023). Efficiency analysis technique with approximate output satisficing approach based on Type-2 Neutrosophic Fuzzy Sets: A case study of container shipping companies, *Expert Systems with Applications*, vol. 218. (2020).
<https://doi.org/10.1016/j.eswa.2023.119596>
- [7] Ö. F. Görçün, A novel integrated MCDM framework based on Type-2 neutrosophic fuzzy sets (T2NN) for the selection of proper Second-Hand chemical tankers, *Transportation Research Part A: Logistics and Transportation Review*, vol.163, 102765. (2022).
<https://doi.org/10.1016/j.tre.2022.102765>
- [8] S. H. Zolfani, Ö. F. Görçün, P. Kundu, H. Küçükönder, Container vessel selection for maritime shipping companies by using an extended version of the Grey Relation Analysis (GRA) with the help of Type-2 neutrosophic fuzzy sets (T2NFN), *Computers & Industrial Engineering*, vol.171, 108376.
- [9] Ö. F. Görçün, D. Pamucar, R. Krishankumar, H. Küçükönder, The selection of appropriate Ro-Ro Vessel in the second-hand market using the WASPAS' Bonferroni approach in type 2 neutrosophic fuzzy environment, *Engineering Applications of Artificial Intelligence*, vol.117, 105531. (2023).
<https://doi.org/10.1016/j.engappai.2022.105531>
- [10] F. Ecer, H. Küçükönder, S. Kayapınar Kaya, Ö. F. Görçün, Sustainability performance analysis of micro-mobility solutions in urban transportation with a novel IVFNN-Delphi-LOPCOW-CoCoSo framework, *Transportation Research Part A: Policy and Practice*, vol.172, 103667. (2023).
<https://doi.org/10.1016/j.tra.2023.103667>
- [11] Ö. F. Görçün, H. Küçükönder, Performance analysis of domestic energy usage of European cities from the perspective of externalities with a combined approach based on type 2 neutrosophic fuzzy sets, In *Advancement in Oxygenated Fuels for Sustainable Development*. (2023).
<https://doi.org/10.1016/b978-0-323-90875-7.00012-5>

(Ömer Faruk Görçün) KADIR HAS UNIVERSITY, BUSINESS ADMINISTRATION DEPARTMENT, 84030, ISTANBUL, TURKEY

Email address, Ömer Faruk Görçün: omer.gorcun@khas.edu.tr

(Hande Küçükönder) BARTIN UNIVERSITY, NUMERICAL METHODS DEPARTMENT, 74100, BARTIN, TURKEY

Email address: hkucukonder@bartin.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 57-58

SOLVING NONLINEAR SHE EQUATIONS USING HHO ALGORITHM

YASİN BEKTAŞ

0000-0002-3681-0123

ABSTRACT

Selective Harmonic Elimination-Pulse Width Modulation (SHE-PWM) is a widely used modulation technique in power electronics. However, solving SHE equations requires complex and computationally intensive calculations. To tackle this complexity, algorithms inspired by nature have been developed. This study focuses on the solution of 11-level nonlinear SHE equations using the Harris Hawks Optimization (HSO) algorithm. The results demonstrate the effectiveness of the HSO algorithm in solving nonlinear SHE equations for 11-level modulation schemes within the modulation index range of 0.1 to 1.0.

REFERENCES

- [1] M. Ohkita, Y. Kobayashi, M. Inoue, Application of the Haar functions to solution of differential equations, *Mathematics and Computers in Simulation*, 25(1), 31-38 (1983).
- [2] S. K. Chhabra, R. Kumar, V. Mittal, Prediction equations for spirometry for children from northern India, *Indian pediatrics*, 53, 781-785, (2016).
- [3] A. Akbulut, and F. Taşcan, Application of conservation theorem and modified extended tanh-function method to (1+ 1)-dimensional nonlinear coupled Klein-Gordon-Zakharov equation, *Chaos, Solitons and Fractals*, 104, 33-40, (2017).
- [4] M. Y. Lada, M. S. A. Khiar, S. A. Ghani, M. R. M. Nawawi, A. S. M. Nor, and J. G. M. Yuen, Performance analysis of SHE-PWM using Fourier Series and Newton-Raphson analysis, In *AIP Conference Proceedings* (Vol. 1660, No. 1, p. 070046). AIP Publishing LLC, (2015).
- [5] P. F., Rasmussen and N. Gautam, Alternative PWM-estimators of the Gumbel distribution, *Journal of Hydrology*, 280(1-4), 265-271. (2003).
- [6] H. Karaca, and E. Bektas, Selective Harmonic Elimination Using Genetic Algorithm for Multilevel Inverter with Reduced Number of Power Switches. *Engineering Letters*, 24(2), (2016).
- [7] B. Ahmadi, O. Ceylan, and A. Özdemir, Grey wolf optimizer for allocation and sizing of distributed renewable generation, In 2019 54th international universities power engineering conference (UPEC) (pp. 1-6). IEEE, (2019).
- [8] B. Ahmadi, O. Ceylan, and A. Ozdemir. A multi-objective optimization evaluation framework for integration of distributed energy resources, *Journal of Energy Storage*, 41, 103005, (2021).

Date: July, 8, 2023.

- [9] E. Amini, D. Golbaz, R. Asadi, M. Nasiri, O. Ceylan, M. Majidi Nezhad, and M. Neshat, A comparative study of metaheuristic algorithms for wave energy converter power take-off optimization: A case study for eastern Australia, *Journal of Marine Science and Engineering*, 9(5), 490, (2021).
- [10] A. A. Heidari, S. Mirjalili, Faris, H., Aljarah, I., Matarja, M., and Chen, H. , Harris hawks optimization: Algorithm and applications, *Future generation computer systems*, 97, 849-872, (2019).
- [11] Y. Sahali, and M. K. Fella, Selective harmonic eliminated pulse-width modulation technique (SHE PWM) applied to three-level inverter/converter, In 2003 IEEE International Symposium on Industrial Electronics (Cat. No. 03TH8692) (Vol. 2, pp. 1112-1117), IEEE, (2003).

AKSARAY UNIVERSITY VOCATIONAL SCHOOL OF TECHNICAL SCIENCES, CENTER/AKSARAY, TURKEY

Email address: yasin.bektas@aksaray.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 59-60

DNA CODES FROM REVERSIBLE GROUP CODES BY A VIRUS OPTIMISATION ALGORITHM

ADRIAN KORBAN, SERAP ŞAHINKAYA, AND DENİZ USTUN

ABSTRACT. In this paper, we employ group rings and some known results on group codes to study reversible group DNA codes. We define and study reversible cyclic DNA codes from a group ring point of view and we also introduce the notion for self-reciprocal group ring elements. Moreover, we search for reversible group DNA codes with the use of a virus optimisation algorithm. We obtain many good DNA codes that satisfy the Hamming distance, the reverse, the reverse-complement and the fixed GC-content constraints.

REFERENCES

- [1] L. Adleman, “Molecular computation of the solutions to combinatorial problems”, Science, vol. 266, pp. 1021–1024, 1994.
- [2] K.G. Benerjee, S. Deb, M.K. Gupta, “On conflict free DNA codes”, Cryptogr. Commun. 13, 143–171 (2021). <https://doi.org/10.1007/s12095-020-00459-7>.
- [3] W. Bosma, J. Cannon and C. Playoust, “The Magma algebra system. I. The user language”, J. Symbolic Comput., vol. 24, pp. 235–265, 1997.
- [4] Y. Cengellenmis, A. Dertli, S.T. Dougherty, A. Korban, S. Sahinkaya, D. Ustun, “Reversible G -Codes over the Ring $\mathcal{F}_{j,k}$ with Applications to DNA Codes”, AMC, Doi: 10.3934/amc.2021056.
- [5] Cuevas, J. R., H. J. Wang, Y. C. Lai, and Y. C. Liang. “Virus Optimization Algorithm: A Novel Metaheuristic for Solving Continuous Optimization Problems.” The 10th Asia Pacific Industrial Engineering Management System Conference, 2166–2174.2009.
- [6] S.T. Dougherty, J. Gildea, R. Taylor and A. Tyshchak, “Group rings, G -codes and constructions of self-dual and formally self-dual codes”, Designs, Codes and Cryptography, vol. 86, pp. 2115–2138, 2018.
- [7] P. Gaborit, O. D. King, “Linear Constructions for DNA Codes”, Theoretical Computer Science, vol. 334, pp. 99–113, 2005.
- [8] F. Gursoy, E. S. Oztas, I. Siap, “Reversible DNA codes over $\mathbb{F}_{16} + u\mathbb{F}_{16} + v\mathbb{F}_{16} + uv\mathbb{F}_{16}$ ”, Adv. Math. Commun., vol. 11, 307–312, 2017.
- [9] H. J. Kim, W-H. Choi, Y. Lee, “Designing DNA codes from reversible self-dual codes over $GF(4)$ ”, Discrete Mathematics, vol. 344, 2021.
- [10] A. Korban, S. Sahinkaya and D. Ustun, “An Application of the Virus Optimization Algorithm to the Problem of Finding Extremal Binary Self-Dual Codes”, arXiv:2103.07739, in submission.

Date: July, 8, 2023.

Key words and phrases. DNA codes, Reversible codes, Group codes.

Serap Sahinkaya would like to thank TUBITAK for the financial support while writing this paper (Grant No:1059B192000947).

- [11] A. Korban, S.Sahinkaya, D. Ustun, “DNA Codes from Reversible Group Codes by a Virus Optimisation Algorithm”, available at <https://sites.google.com/view/adriankorban/generator-matrices>.
- [12] A. Marathe, A.E. Condon, R.M. Corn, “On a combinatorial DNA word design”, *J. Comput. Biol.*, vol. 8, pp. 201–220, 2001.
- [13] J.L. Massey, “Reversible codes”, *Information and Control*, vol. 7, 369–380, 1964.
- [14] Song, W., Cai, K., Zhang, M., Yuen, C.: Codes with run-length and GC-content constraints for DNA-based data storage. *IEEE Commun. Lett.* 22(10), 2004–2007 (2018). <https://doi.org/10.1109/LCOMM.2018.2866553>.
- [15] E. S. Oztas, B. Yildiz, I. Siap, “A novel approach for constructing reversible codes and applications to DNA codes over the ring $\mathbb{F}_2[u]/(u^{2^k} - 1)$ ”, *Finite Fields and Their Applications*, vol. 46, pp. 217–234, 2017.
- [16] E.S. Oztas and I. Siap, “Revised Polynomials over F_{16} and Their Applications to DNA Codes”, *Filomat*, vol. 27, 459–466, 2013.
- [17] Zhu, X., Sun, C., Liu, W., Wu, W. “Research on the counting problem based on linear constructions for DNA codes”. In: *Proceedings Computational Intelligence and Bioinformatics*, pp. 294–302 (2006).

(Adrian Korban) DEPARTMENT OF MATHEMATICAL AND PHYSICAL SCIENCES, UNIVERSITY OF CHESTER, THORNTON SCIENCE PARK, POOL LN, CHESTER CH2 4NU, ENGLAND,

Email address, Adrian Korban: adrian3@windowslive.com

(Serap Şahinkaya) TARSUS UNIVERSITY, FACULTY OF ENGINEERING, DEPARTMENT OF NATURAL AND MATHEMATICAL SCIENCES, MERSIN, TURKEY,

Email address, Serap Şahinkaya: serap@tarsus.edu.tr

(Deniz Ustun) TARSUS UNIVERSITY, FACULTY OF ENGINEERING, DEPARTMENT OF COMPUTER ENGINEERING, MERSIN, TURKEY

Email address, Deniz Ustun: denizustun@tarsus.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 61

GEODETIC INDEX OF GRAPHS

GLEE ANN L. TAMPIPI AND ROSALIO G. ARTES JR.

0000-0002-5396-149X and 0000-0002-9087-3248

ABSTRACT

Let G be a connected graph. For two vertices u and v in a graph G , the geodesic closure of $\{u, v\}$ is the set $I_G[u, v] = \{u, v\} \cup \{y : y \text{ lies in a } u\text{-}v \text{ path in } G\}$. We introduced a new graph topological index called the geodetic index of G which is given by $g_i(G) = \sum_{u,v \in V(G)} |I_G[u, v]|$. In this paper, established relationships between the graph theoretic properties of G and its corresponding geodetic index. Moreover, we have generated results on the geodetic index of some special graphs and graphs resulting from the join and the corona of two connected graphs.

REFERENCES

- [1] F. Harary. *Graph Theory*. CRC Press, Boca Raton, 2018.
- [2] M. Eliasi, G. Raeisi, B. Taeri. Wiener index of some graph operations. *Discrete Applied Mathematics*, 160:1333-1344, 2012.
- [3] R.G. Domenech, J. Gálvez, J.V. de Julián-Ortiz, L. Pogliani View Author Information. Some New Trends in Chemical Graph Theory. *Chem. Rev.*, 108(3):1127–1169, 2008.

(Glee Ann L. Tampipi) CENTRAL MINDANAO UNIVERSITY, DEPARTMENT OF MATHEMATICS, 8710, MUSUAN, BUKIDNON, PHILIPPINES
Email address: f.gleeann.lumauag@cmu.edu.ph

(Rosalio G. Artes Jr.) MINDANAO STATE UNIVERSITY - TAWI-TAWI COLLEGE OF TECHNOLOGY AND OCEANOGRAPHY, MATHEMATICS AND SCIENCES DEPARTMENT, 7500, BONGAO, TAWI-TAWI, PHILIPPINES
Email address: rosaliocartes@msutawi-tawi.edu.ph

Date: July, 8, 2023.

2020 Mathematics Subject Classification. 68R10, 92E10.

Key words and phrases. Geodetic index, Topological index, Geodetic closure.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 62-63

INDUCED PATH POLYNOMIALS OF THE JOIN AND CORONA OF GRAPHS

CERINA A. VILLARTA, ROLITO G. EBALLE, AND ROSALIO G. ARTES JR.

0009-0001-5068-6704, 0000-0003-1762-0970 and 0000-0002-9087-3248

ABSTRACT

Let G be a connected graph. An induced path in G is a path in G induced by a subset of $V(G)$. The induced path polynomial of G , denoted by $P(G; x)$, is the generating function of the sequence $\langle p_i(G) \rangle_{i=0}^{\infty}$, where $p_i(G)$ is the number of induced paths in G of order i . In this paper, we characterized the induced paths in graphs resulting from the join and corona of two connected graphs. Finally, we established the induced path polynomials of graphs resulting from these two binary graphs operations in terms of the induced path polynomials of the graphs being considered.

REFERENCES

- [1] J. Ellis-Monaghan, J. Merino. *Graph Polynomials and Their Applications II: Interrelations and Interpretations*. Birkhauser, Boston, 2011.
- [2] E.J. Farrell. A note on the clique polynomial and its relation to other graph polynomials. *J. Math.Sci. Calcutta*, 8:97-102, 1997.
- [3] I. Gutman, F. Harary. Generalizations of the Matching Polynomial. *Utilitas Mathematica*, 24:97-106, 1983.
- [4] F. Harary. *Graph Theory*. CRC Press, Boca Raton, 2018.
- [5] C. Hoede, X. Li. Clique Polynomials and independent set Polynomials of Graphs. *Discrete Mathematics*, 125:219-228, 1994.
- [6] C.A. Villarta, R.G. Eballe, R.G. Artes Jr.. Induced path polynomial of graphs, *Advances and Applications in Discrete Mathematics* 39(2) (2023), 183-190. <http://dx.doi.org/10.17654/0974165823045>

Date: July, 8, 2023.

2020 Mathematics Subject Classification. Primary 05C25, 05C30, 05C31.

Key words and phrases. Induced path, Induced path polynomial, graph polynomial.

(Cerina A. Villarta) CENTRAL MINDANAO UNIVERSITY, DEPARTMENT OF MATHEMATICS, 8710, MUSUAN, BUKIDNON, PHILIPPINES

Email address: f.cerina.villarta@cmu.edu.ph

(Rolito G. Eballe) CENTRAL MINDANAO UNIVERSITY, DEPARTMENT OF MATHEMATICS, 8710, MUSUAN, BUKIDNON, PHILIPPINES

Email address: rgeballe@cmu.edu.ph

(Rosalio G. Artes Jr.) MINDANAO STATE UNIVERSITY - TAWI-TAWI COLLEGE OF TECHNOLOGY AND OCEANOGRAPHY, MATHEMATICS AND SCIENCES DEPARTMENT, 7500, BONGAO, TAWI-TAWI, PHILIPPINES

Email address: rosalio.artes@msu-tawi-tawi.edu.ph

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 64-65

CONVEX INDEPENDENT COMMON NEIGHBORHOOD POLYNOMIAL OF GRAPHS

AMELIA L. ARRIESGADO AND ROSALIO G. ARTES JR.

0009-0006-2159-2502 and 0000-0002-9087-3248

ABSTRACT

For two vertices u and v in a graph G , the geodetic closure of $\{u, v\}$ is the set $I_G[u, v] = \{u, v\} \cup \{y : y \text{ lies in a } u\text{-}v \text{ path in } G\}$. The geodetic closure of a subset S of $V(G)$ is the set $I_G[S] = \bigcup_{u, v \in S} I_G[u, v]$. A subset S of $V(G)$ is said to be convex

if for every pair of vertices $\{u, v\} \subseteq S$, the geodetic closure of $\{u, v\}$ is contained entirely in S . A convex subset of cardinality i is called an i -convex set. The convexity number of a graph G is the cardinality of a maximum proper convex subset of $V(G)$ and is denoted by $con(G)$. A convex subgraph as defined by Artes and Laja [2] in 2014, is a subgraph of G induced by a convex subset of $V(G)$.

We introduce a new graph polynomial as follows: The convex independent common neighborhood polynomial of a graph G of order n in the indeterminates x and y is given by $\Gamma_{cicn}(G; x, y) = \sum_{j=0}^{n-i} \sum_{i=1}^n c_{ij}(G) x^i y^j$, where $c_{ij}(G)$ is the number of i -convex subsets in G with a corresponding maximum independent subset of the common neighborhood system has cardinality equal to j .

In this paper, we established the convex independent common neighborhood polynomial of graphs resulting from the join and the corona of two connected graphs.

REFERENCES

- [1] N. Abdulcarim, S. Dagondon, and E. Chacon. On the independent neighborhood polynomial of the cartesian product of some special graphs. *European Journal of Pure and Applied Mathematics*, 14(1):173–191, 2021.
- [2] R.G. Artes Jr. and L.S. Laja. Zeros of convex subgraph polynomials. *Applied Mathematical Sciences*, 8(59):2917–2923, 2014.

Date: July, 8, 2023.

2020 Mathematics Subject Classification. 05C25, 05C30, 05C31.

Key words and phrases. Geodetic set, Convex set, Independent set, Convex independent common neighborhood polynomial.

- [3] R.G. Artes Jr., M.A. Langamin, and A.B. Calibog. Clique common neighborhood polynomial of graphs. *Advances and Applications in Discrete Mathematics*, 35:77–85, 2022.
- [4] R.G. Artes Jr. and M.J.F. Luga. Convex accessibility in graphs. *Applied Mathematical Sciences*, 8(88):4361–4366, 2014.
- [5] J.A. Bondy and U.S.R. Murty. *Graph Theory and Related Topics*. Academic Press, New York, 1979.
- [6] J. Brown and R. Nowakowski. The neighborhood polynomial of a graph. *Australasian Journal of Combinatorics*, 42:55–68, 2008.
- [7] J. Ellis-Monaghan and J. Merino. *Graph Polynomials and Their Applications II: Interrelations and Interpretations*. Birkhäuser, Boston, 2011.
- [8] J.L. Gross and J. Yellen. *Graph Theory and Its Applications*. Chapman & Hall, New York, 2006.
- [9] I. Gutman. Graphs and graph polynomials of interest in chemistry. In Gottfried Tinhofer and Gunther Schmidt, editors. *Lecture Notes in Computer Science*, pages 177–187, Berlin, 2005. Springer-Verlag.
- [10] C. Hoede and X. Li. Clique polynomials and independent set polynomials of graphs. *Discrete Mathematics*, 125:219–228, 1994.

(Amelia L. Arriesgado) BOHOL ISLAND STATE UNIVERSITY, COLLEGE OF ARTS AND SCIENCES,
CPC NORTH AVENUE, 6300 TAGBILARAN CITY, BOHOL, PHILIPPINES
Email address: amelia.arriesgado@bisu.edu.ph

(Rosalio G. Artes Jr.) MINDANAO STATE UNIVERSITY - TAWI-TAWI, MATHEMATICS AND SCI-
ENCES DEPARTMENT, 7500, BONGAO, TAWI-TAWI, PHILIPPINES
Email address: rosaliocartes@msutawi-tawi.edu.ph

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 66-67

MASKED AND UNMASKED FACE RECOGNITION ON UNCONSTRAINED FACIAL IMAGES USING HAND-CRAFTED METHODS

ALI TORBATI AND ÖNSEN TOYGAR

0009-0005-5908-5840 and 0000-0001-7402-9058

ABSTRACT

In this study we tried to apply the face recognition task on masked faces using hand-crafted methods. Due to COVID-19 and masks, facial identification from unconstrained images became a hot topic. To avoid COVID-19, most people use masks outside. In many cases, typical facial recognition technology is useless. The majority of contemporary advanced face recognition methods are based on deep learning, which primarily relies on a huge number of training examples, however, masked face recognition may be investigated using hand-crafted approaches at a lower computing cost than using deep learning systems. We intend to construct a low-cost system for recognizing masked faces and compare its performance to that of face recognition systems that do not use masks. The proposed method fuses handcrafted methods using feature-level fusion strategy. This study compares the performance of masked and unmasked face recognition systems. Experiments are undertaken on two publicly accessible datasets for masked face recognition: Masked Labeled Faces in the Wild (MLFW) and Cross-Age Labeled Faces in the Wild (CALFW). The results are encouraging compared to the state-of-the-art models.

REFERENCES

- [1] G. E. Rani, S. M. M. P. Suresh, M. Abhiram, K. J. Surya and B. Y. A. N. Kumar, "Face Recognition Using Principal Component Analysis," 2022 2nd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), pp. 932-936, (2022), doi: 10.1109/ICACITE53722.2022.9823434.
- [2] O. S. Kulkarni, S. M. Deokar, A. K. Chaudhari, S. S. Patankar and J. V. Kulkarni, "Real Time Face Recognition Using LBP Features," 2017 International Conference on Computing, Communication, Control and Automation (ICCUBEA), (2017), pp. 1-5, doi: 10.1109/ICCUBEA.2017.8463886.

Date: July, 8, 2023.

Key words and phrases. Masked Face Recognition, Unmasked Face Recognition, Hand-Crafted Methods.

- [3] H. Ahamed, I. Alam and M. M. Islam, "HOG-CNN Based Real Time Face Recognition," 2018 International Conference on Advancement in Electrical and Electronic Engineering (ICAEEE), pp. 1-4, (2018), doi: 10.1109/ICAEEE.2018.8645989.
- [4] T. Zheng, W. Deng, and J. Hu, "Cross-age LFW: A Database for studying cross-age face recognition in unconstrained environments," *CoRR*, vol. abs/1708.08197, (2017).
- [5] C. Wang, H. Fang, Y. Zhong, and W. Deng, "M-LFW: A Database for Face Recognition on Masked Faces," In: et al. *Biometric Recognition. CCBR 2022. Lecture Notes in Computer Science*, vol 13628. Springer, Cham, (2022). doi: 10.1007/978-3-031-20233-9-18.
- [6] Q. Wang, P. Zhang, H. Xiong, and J. Zhang, "Face.evoLve: A High-Performance Face Recognition Library," arXiv.org, Jun 19, (2021). <https://arxiv.org/abs/2107.08621v4>
- [7] J. Deng, J. Guo, N. Xue and Z. Zafei'rou, "ArcFace: Additive Angular Margin Loss for Deep Face Recognition," 2019 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), Long Beach, CA, USA, (2019), pp. 4685-4694, doi: 10.1109/CVPR.2019.00482.
- [8] D. Yi, Z. Lei, S. Liao, and S. Z. Li, "Learning Face Representation from Scratch," arXiv.org, Nov. 28, (2014) <http://arxiv.org/abs/1411.7923v1>
- [9] Q. Cao, L. Shen, X. Sun, O. M. Parkhi and A. Zisserman, "VGGFace2: A Dataset for Recognising Faces across Pose and Age," 2018 13th IEEE International Conference on Automatic Face & Gesture Recognition (FG 2018), Xi'an, China, pp. 67-74, (2018), doi: 10.1109/FG.2018.00020.
- [10] Y. Guo, L. Zhang, Y. Hu, X. He, and J. Gao, "MS-Celeb-1M: A Dataset and Benchmark for Large-Scale Face Recognition," Sep. 17, (2016). https://link.springer.com/chapter/10.1007/978-1-4939-9319-4_6487-9-6.
- [11] Y. Huang et al., "CurricularFace: Adaptive Curriculum Learning Loss for Deep Face Recognition," 2020 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), Seattle, WA, USA, pp. 5900-5909, (2020), doi: 10.1109/CVPR42600.2020.00594.
- [12] Y. Zhong, W. Deng, J. Hu, D. Zhao, X. Li and D. Wen, "SFace: Sigmoid-Constrained Hypersphere Loss for Robust Face Recognition," in *IEEE Transactions on Image Processing*, vol. 30, pp. 2587-2598, (2021), doi: 10.1109/TIP.2020.3048632.

COMPUTER ENGINEERING DEPARTMENT, FACULTY OF ENGINEERING, EASTERN MEDITERRANEAN UNIVERSITY, 99628, FAMAGUSTA, NORTH CYPRUS, VIA MERSIN 10, TURKEY

Email address: ali.torbati@emu.edu.tr

COMPUTER ENGINEERING DEPARTMENT, FACULTY OF ENGINEERING, EASTERN MEDITERRANEAN UNIVERSITY, 99628, FAMAGUSTA, NORTH CYPRUS, VIA MERSIN 10, TURKEY

Email address: onsen.toygar@emu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 68

A NOTE ON HIGHER ORDER PELL 2^s -IONS

HAYRULLAH ÖZİMAMOĞLU

0000-0001-7844-1840

ABSTRACT

In this study, we describe higher order Pell numbers. We establish higher order Pell 2^s -ions whose components are these numbers. We obtain recurrence relation, Binet's formula, generating function, exponential generating function, Vajda's identity, Catalan's identity, Cassini's identity and d'Ocagne's identity of higher order Pell 2^s -ions. In addition, we generate a matrix whose entries are higher order Pell 2^s -ions and use these matrices to obtain Cassini's identity as a novel type.

REFERENCES

- [1] P. Catarino, k -Pell, k -Pell–Lucas and modified k -Pell sedenions, Asian-European Journal of Mathematics, 12(02), 1950018, (2019).
- [2] C.B. Çimen, A. İpek, On Pell quaternions and Pell-Lucas quaternions, Advances in Applied Clifford Algebras, 26, 39–51, (2016).
- [3] J. Ercolano, Matrix generators of Pell sequences, Fibonacci Quarterly, 17(1), 71-77, (1979).
- [4] M. Göcen, Y. Soykan, Horadam 2^k -ions, Konuralp Journal of Mathematics, 7(2), 492–501, (2019).
- [5] A.F. Horadam, Pell identities, Fibonacci Quarterly, 9(3), 245-252, (1971).
- [6] C. Kızılateş, T. Kone, On higher order Fibonacci hyper complex numbers, Chaos, Solitons & Fractals, 148, 111044, (2021).
- [7] C. Kızılateş, T. Kone, On higher order Fibonacci quaternions, The Journal of Analysis, 29, 1071-1082, (2021).
- [8] T. Koshy, Pell and Pell-Lucas numbers with applications, New York: Springer, (2014).
- [9] E. Özkan, M. Uysal, On quaternions with higher order Jacobsthal numbers components, Gazi University Journal of Science, 36(1), 336-347, (2023).
- [10] A. Szyjal-Liana, I. Włoch, The Pell quaternions and the Pell octonions, Advances in Applied Clifford Algebras, 26, 435-440, (2016).
- [11] M. Uysal, E. Özkan, Higher order Jacobsthal–Lucas quaternions, Axioms, 11(12), 671, (2022).

DEPARTMENT OF MATHEMATICS, FACULTY OF ARTS AND SCIENCES, NEVŞEHİR HACI BEKTAŞ VELİ UNIVERSITY, NEVŞEHİR, 50300, TURKEY

Email address: h.ozimamoglu@nevsehir.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 11B39, 11R52; 11B37, 05A15.

Key words and phrases. 2^s -ions, Higher order Pell numbers, Higher order Pell 2^s -ions, Recurrence relation, Matrix representation.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 69

SOME PROPERTIES OF LEONARDO SEDENIONS

HAYRULLAH ÖZİMAMOĞLU

0000-0001-7844-1840

ABSTRACT

In this study, we investigate Leonardo sedenions. We provide some relationships among Fibonacci, Lucas and Leonardo sedenions. Furthermore, we derive recurrence relations, generating function, Binet's formula, exponential generating function, Catalan's identity, Cassini's identity and d'Ocagne's identity of Leonardo sedenions.

REFERENCES

- [1] Y. Alp, E.G. Koçer, Some properties of Leonardo numbers, Konuralp Journal of Mathematics, 9(1), 183-189, (2021).
- [2] G. Bilgici, Ü. Tokeşer, Z. Ünal, Fibonacci and Lucas sedenions, Journal of Integer Sequences, 20, 17.1.8, (2017).
- [3] P. Catarino, A. Borges, On Leonardo numbers, Acta Mathematica Universitatis Comenianae, 89(1), 75-86, (2019).
- [4] R. Cawagas, On the structure and zero divisors of the Cayley-Dickson sedenion algebra, Discussiones Mathematicae General Algebra and Applications, 24(2), 251-265, (2004).
- [5] K. Imaeda, M. Imaeda, Sedenions: algebra and analysis, Applied Mathematics and Computation, 115(2-3), 77-88, (2000).
- [6] M. Mangueira, R. Vieira, F. Alves, P. Catarino, A generalização dos duais e sedenions de Leonardo, C.Q.D.-Revista Eletrônica Paulista de Matemática, 20, 13-27, (2021).
- [7] R. Vieira, F. Alves, P. Catarino, A generalização dos sedenions de Leonardo e Narayana, C.Q.D.-Revista Eletrônica Paulista de Matemática, 22(3), 9-24, (2022).
- [8] R. Vieira, F. Alves, P. Catarino, Relações bidimensionais e identidades da sequência de Leonardo, Revista Sergipana de Matemática e Educação Matemática, 4(2), 156-173, (2019).
- [9] R. Vieira, M. Mangueira, F. Alves, P. Catarino, Leonardo's three-dimensional relations and some identities, Notes on Number Theory and Discrete Mathematics, 27(4), 32-42, (2021).

DEPARTMENT OF MATHEMATICS, FACULTY OF ARTS AND SCIENCES, NEVŞEHİR HACI BEKTAŞ VELİ UNIVERSITY, NEVŞEHİR, 50300, TURKEY
Email address: h.ozimamoglu@nevsehir.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 11B39, 11R52; 11B37, 11B83.

Key words and phrases. Sedenions, Fibonacci sedenions, Lucas sedenions, Leonardo sedenions.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 70-71

ON MODELING ON MULTIPLICATIVE CALCULUS FOR POPULATION GROWTH

Y. Z. ALTAY, A. BUCAK, AND S. GOKTAS

ABSTRACT

Grossman and Katz developed a comprehensive framework of calculus that extended beyond classical calculus, encompassing various branches of non-Newtonian calculus [6]. Non-Newtonian calculus, with its infinite sub-branches, such as geometric, anageometric, biogeometric, quadratic, and harmonic calculus, offers diverse perspectives. Among these sub-branches, geometric calculus, also known as multiplicative calculus [1, 7], introduces a distinct approach. Multiplicative calculus proves particularly valuable in scenarios where products and ratios naturally facilitate the combination and comparison of magnitudes. Numerous authors [1, 3–5] have extensively explored the principles of multiplicative calculus in various studies. In this study, population growth models, which are based on classical differential equations and whose solutions are determined by an exponential function, will be reconstructed on multiplicative calculus and solutions of equations containing multiplicative derivatives will be found in the established models.

REFERENCES

- [1] A. E. Bashirov, E. M. Kurpinar, and A. Özyapıcı, Multiplicative calculus and its applications, *Journal of Mathematical Analysis and Applications*, 337(1), 36–48 (2008).
- [2] A. E. Bashirov, E. Mısırlı, Y. Tandoğdu and A. Özyapıcı, On modeling with multiplicative differential equations, *Applied Mathematics-A Journal of Chinese Universities*, 26, 425-438 (2011).
- [3] F. Benford, The law of anomalous numbers, *Proceedings of the American Philosophical Society*, 78(4), 551-572 (1938).
- [4] K. Boruah and B. Hazarika, G-Calculus, *TWMS Journal of Applied and Engineering Mathematics*, 8(1), 94-105 (2018).
- [5] L. Florack and Hv. Assen, Multiplicative Calculus in Biomedical Image Analysis, *Journal of Mathematical Imaging and Vision*, 42(1), 64-75 (2012).
- [6] M. Grossman, An introduction to Non-Newtonian calculus, *International Journal of Mathematical Education in Science and Technology*, 10(4), 525-528 (1979).
- [7] D. Stanley, A multiplicative calculus, *Primus*, 9 (4), 310–326 (1999).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 00A71, 11N05, 97M10.

Key words and phrases. Exponential arithmetic, Multiplicative calculus, Modeling, Population growth.

This study was supported by TÜBİTAK 2209-A.

(Yusuf Ziya ALTAY) DEPARTMENT OF MATHEMATICS, FACULTY OF SCIENCE, MERSIN UNIVERSITY, 33343, MERSIN, TURKEY

(Aşlı BUCAK) DEPARTMENT OF MATHEMATICS, FACULTY OF SCIENCE, MERSIN UNIVERSITY, 33343, MERSIN, TURKEY

(Sertac GOKTAS) DEPARTMENT OF MATHEMATICS, FACULTY OF SCIENCE, MERSIN UNIVERSITY, 33343, MERSIN, TURKEY

Email address: srtcgoktas@gmail.com

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 72-73

**THE EVALUATION OF THE CRITERIA TO BE TAKEN INTO
ACCOUNT WHEN SELECTING ONLINE SHOPPING SITES
BASED ON INDUSTRY 4.0 WITH USING DEMATEL METHOD**

ZEYNEP DURMAZ AND ERDEM AKSAKAL

ABSTRACT

In recent years, with the rapid development of technology and the increasing use of the Internet, interest in online shopping sites has increased even more. Given this growing consumer interest, the competition among online shopping sites is increasing daily. In this competitive environment, it is of great importance to be a preferred platform that attracts consumers' attention. This study discusses the evaluation process of the criteria believed to be effective in the preference of online shopping sites based on Industry 4.0. The criteria to be considered in the study are: product information and variety, timely and accurate delivery, website design and performance, reliability/confidentiality, and customer satisfaction. The DEMATEL method will be used to determine the relationships and importance of these criteria. In this way, the process of determining the criteria to be considered in the environment of online competition will be shown and the criteria that are assumed to contribute to it will be evaluated.

REFERENCES

- [1] Hung, Y. H., Chou, S. C. T., Tzeng, G. H., Using a fuzzy group decision approach-knowledge management adoption. APRU DLI 2006 Conference, University of Tokyo Japan, 48-52, (2006).
- [2] Tzeng, G. H., Chiang, C. H., Li, C. W., Evaluating intertwined effects in e-learning programs: A novel hybrid MCDM model based on factor analysis and DEMATEL. Expert systems with Applications, 32(4), 1028-1044, (2007).
- [3] Aksakal, E., Dağdeviren, M., ANP ve DEMATEL yöntemleri ile personel seçimi problemine bütünlük bir yaklaşım. Gazi Üniversitesi Mühendislik Mimarlık Fakültesi Dergisi, 25(4), (2010).
- [4] Tsai, W. H., Chou, W. C., Selecting management systems for sustainable development in SMEs: A novel hybrid model based on DEMATEL, ANP, and ZOGP. Expert systems with applications, 36(2), 1444-1458 (2009).
- [5] Chiu, Y. J., Chen, H. C., Tzeng, G. H., Shyu, J. Z., Marketing strategy based on customer behaviour for the LCD-TV. International journal of management and decision making, 7(2-3), 143-165, (2006).
- [6] Hori, S., Shimizu, Y., Designing methods of human interface for supervisory control systems. Control engineering practice, 7(11), 1413-1419, (1999).

Date: July, 8, 2023.

Key words and phrases. Industry 4.0, Multi-Criteria Decision Making, DEMATEL Method.

- [7] Wu, W. W., Lee, Y. T., Developing global managers' competencies using the fuzzy DEMATEL method. *Expert systems with applications*, 32(2), 49-507, (2007).
- [8] Seyed-Hosseini, S. M., Safaei, N., Asgharpour, M. J., Reprioritization of failures in a system failure mode and effects analysis by decision making trial and evaluation laboratory technique. *Reliability engineering system safety*, 91(8), 872-881, (2006).

(author one) ATATURK UNIVERSITY, INDUSTRIAL ENGINEERING DEPARTMENT, 25000, ERZURUM, TURKEY

Email address, author one: zehnepducaz32@gmail.com

(author two) ATATURK UNIVERSITY, INDUSTRIAL ENGINEERING DEPARTMENT, 25000, ERZURUM, TURKEY

Email address, author two: erdem.aksakal@atauni.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 74

CONNECTED, COMPACT, AND SOBER OBJECTS IN *CONLIM*

K.ÇEVİK AND A. ERCİYES

0000-0002-4480-7610 and 0000-0002-0942-5182

ABSTRACT

In this paper, we characterize (strongly) closed subsets of a constant limit space and show that they induce a notion of closure. Furthermore, we introduce the notions of c -connected, compact, quasi-sober, sober, irreducible objects in **ConLim** (the category of constant limit spaces and continuous maps.), where c is a closure operator of **ConLim**. Finally, we examine the relationship as well as interrelationships between them.

REFERENCES

- [1] M.M. Clementino, N. Tholen, Separation versus connectedness. *Topology and its Applications*, 77, pp. 143-181, (1997).
- [2] D. Dikranjan, E. Giuli, Closure operators I, *Topology and its Applications*, 27, 129-143, (1987).
- [3] J. Adamek, H. Herrlich, G.E. Strecker, *Abstract and concrete categories: The joy of cats* (Pure and Applied Mathematics: A Wiley Series of Texts, Monographs and Tracts). New York, USA: John Wiley and Sons, (1990).
- [4] M. Baran, A notion of compactness in topological categories. *Publicationes Mathematicae Debrecen*, 50, pp. 221-234, (1997).
- [5] M. Baran, Closure operators in convergence spaces. *Acta Mathematica Hungarica*, 87, pp. 33-45, (2000).
- [6] M. Baran, Compactness, perfectness, separation, minimality and closedness with respect to closure operators. *Applied Categorical Structures*, 10, pp. 403-415, (2002).

(author one) AKSARAY UNIVERSITY, MATHEMATICS DEPARTMENT, 68100, AKSARAY, TURKEY
Email address, author one: matogrtkubravecik@gmail.com

(author two) AKSARAY UNIVERSITY, MATHEMATICS DEPARTMENT, 68100, AKSARAY, TURKEY
Email address, author two: ayhanerciyes@aksaray.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 54A05, 54A20; 54D10, 54B30.

Key words and phrases. Connectedness, Compactness, Constant limit spaces.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 75-76

FINITE ELEMENT METHOD FOR THE NONLOCAL ELLIPTIC PROBLEM WITH p -KIRCHHOFF-TYPE OPERATOR

MAHAMAD SALIH DAOUSSA HAGGAR AND MOHAMED MBEHOU

0000-0002-0863-2235 and 0000-0002-3938-0800

ABSTRACT

This work is devoted to the study of the finite element method for a class of nonlocal elliptic problems associated with p -Kirchhoff-type operator. There has been active ongoing research on the study of problems associated with the p -Laplace operator, which appears in a variety of physical fields [2, 3, 4]. In particular, a lot of attention has been devoted to nonlocal problems. One of the justifications of such models lies in the fact that in reality the measurements are not made pointwise but through some local average. This work is devoted to the study of the finite element method for a class of nonlocal elliptic problems associated with p -Kirchhoff-type operator. The convergence and *a priori* error estimates for the discrete formulation are established. Moreover, the finite element formulation is nonlinear, it can then be solved by Newton-Raphson's iterative but the main issue is that the Jacobian matrix of the Newton-Raphson method is full due to the presence of the nonlocal term thereby making computation expensive. The scheme presented here takes into account such issues. The predictions observed theoretically are validated by means of numerical experiments.

REFERENCES

- [1] J. C. Duque, R. M. Almeida, S. N. Antontsev, and J. Ferreira, "A reaction-diffusion model for the nonlinear coupled system: existence, uniqueness, long time behavior and localization properties of solutions," *IMA Journal of Applied Mathematics*, pp. 1–21, 2016.
- [2] J. Djoko, J. Lubuma, and M. Mbehou, "On the numerical solution of the stationary power-law Stokes equations: A penalty finite element approach," *Journal of Scientific Computing*, vol. 69, no. 3, pp. 1058–1082, 2016.
- [3] I. Andrei, "Existence theorems for some classes of boundary value problems involving the p (x)-laplacian," *Nonlinear Anal. Model. Control*, vol. 13, pp. 145–158, 2008.
- [4] M. D. Hagggar and M. Mbehou, "On the numerical solution of the nonlocal elliptic problem with a p -Kirchhoff-type term," *Applied Mathematics and Information Sciences, an International Journal*, vol. 15, no. 5, pp. 547–553, 2021.

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 65N12; 65N30; 35K65.

Key words and phrases. Galerkin finite element method, Newton-Raphson method, Nonlocal diffusion term, p -Kirchhoff operator.

(author one) UNIVERSITY OF NDJAMENA, DEPARTMENT OF MATHEMATICS, CHAD
Email address, author one: `msdhaggar@gmail.com`

(author two) UNIVERSITY OF YAOUNDE 1, DEPARTMENT OF MATHEMATICS, CAMEROON
Email address, author two: `mohamed.mbehou@sciences-uy1.cm`

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 77

STATISTICAL CAUCHYNESS WITH DEFERRED CESÀRO MEAN IN ASYMMETRIC CONTEXT

ZEYNEP HANDE TOYGANÖZÜ

0000-0001-6421-5690

ABSTRACT

In this study, deferred Cesàro mean statistical Cauchy sequences were defined in asymmetric metric spaces. Since the lackness of symmetry causes failures several classic statements in the asymmetric context, the conditions required for a deferred statistically convergent sequence to be a deferred statistically Cauchy have been investigated in such spaces.

REFERENCES

- [1] R. P. Agnew, On deferred Cesàro mean, *Ann. Math.*, 33, 413-421, (1932).
- [2] J. Collins, J. Zimmer, An asymmetric Arzelà-Ascoli theorem, *Topology and its Applications*, 154, 2312-2322, (2007).
- [3] M. Et, M. Çınar, H.Şengül, Deferred Statistical Convergence in Metric Spaces, *Conference Proceedings of Science and Technology*, 2(3), 189-193, (2019).
- [4] J. A. Fridy, On statistical convergence, *Analysis*, 5, 241-244, (1985).
- [5] M. Küçükaslan, M. Yılmaztürk, On deferred statistical convergence of sequences, *Kyungpook Math. J.*, 56, 357-366, (2016).

SULEYMAN DEMIREL UNIVERSITY, DEPARTMENT OF MATHEMATICS, 32200, ISPARTA, TURKEY
Email address: handetoyganozu@sdu.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 40A05, 40G05, 54A20.

Key words and phrases. Statistical convergence, Asymmetric metric space, Cauchy sequence, Deferred Cesàro mean.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 78

COMPARISON OF PREDICTORS/ESTIMATORS IN GENERAL LINEAR MODELS WITH STOCHASTIC RESTRICTIONS

N. GÜLER AND M. ERİŞ BÜYÜKKAYA

0000-0003-3233-5377 and 0000-0002-6207-5687

ABSTRACT

In this study, we have given some results regarding the comparison of predictors/estimators under general linear models with stochastic restrictions. By choosing the best linear unbiased predictors/estimators (BLUPs/BLUEs), which is one of the predictors/estimators, we have obtained comparisons according to the mean square error matrix criterion (MSEM). We have used rank and inertia formulas in matrix algebra. For topics related to the results obtained in this paper, please refer to the following references [1]-[3].

REFERENCES

- [1] J. Xu, H. Yang, Estimation in singular linear models with stochastic linear restrictions, *Commun. Statist. Theory and Methods*, 36 (10), 1945–1951, (2007).
- [2] S. J. Haslett, S. Puntanen, Equality of BLUEs or BLUPs under two linear models using stochastic restrictions, *Stat. Pap.*, 51, 465–475, (2010).
- [3] X. Ren, The equalities of estimations under a general partitioned linear model and its stochastically restricted model, *Commun. Statist. Theory and Methods*, 45 (22), 6495–6509, (2016).

(Nesrin Güler) SAKARYA UNIVERSITY, DEPARTMENT OF ECONOMETRICS, SAKARYA, TURKEY
Email address, Nesrin Güler: nesring@sakarya.edu.tr

(Melek Eriş Büyükkaya) KARADENİZ TECHNICAL UNIVERSITY, DEPARTMENT OF STATISTICS AND
COMPUTER SCIENCES, TRABZON, TURKEY
Email address, Melek Eriş Büyükkaya: melekeris@ktu.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 62J05, 62H12; 15A03.

Key words and phrases. BLUE, BLUP, General linear models, MSEM, Stochastic restriction.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 79-80

**APPROXIMATE SOLUTIONS OF THE INTEGRO-PARTIAL
FRACTIONAL EQUATION INVOLVING TEMPERED ψ -CAPUTO
FRACTIONAL DERIVATIVE**

S. B. ROUDI, M. ELOMARI, A. EL MFADEL, AND A. KASSIDI

0009-0001-5214-7827, 0000-0002-2479-1762 and 0000-0002-9105-1123

ABSTRACT

This manuscript proposes an approximate solution for weakly singular kernel partial integrodifferential equations with tempered ψ -Caputo fractional derivative of order $\alpha \in (0, 1)$. Our method employs a second order time difference approximation and uses the tempered fractional integral operator together with piecewise linear interpolation to compute the singularity of the kernel arising during the discretisation process. In addition, the stability of the method is evaluated by using Von Neumann analysis. To show the reliability and applicability of the proposed approach, numerical examples have been solved.

REFERENCES

- [1] R. Agarwal, S. Hristova and D. O'Regan, A survey of Lyapunov functions, stability and impulsive Caputo fractional differential equations, *Fract. Calc. Appl. Anal.* 19(2) (2016), 290–318. 10.1515/fca-2016-0017.
- [2] R. Almeida, A Caputo fractional derivative of a function with respect to another function, *Commun. Nonlinear Sci. Numer. Simul.* 44 (2017), 460–481. 10.1016/j.cnsns.2016.09.006.
- [3] Baleanu, D., Diethelm, K., Scalas, E., Trujillo, J. J.: Fractional calculus: models and numerical methods (Vol. 3). *World Scientific.* (2012).
- [4] A. El Mfadel, F. E. Bourhim and M. Elomari, Existence of mild solutions for semilinear Ψ -Caputo-type fractional evolution equations with nonlocal conditions in Banach spaces, *Results Nonlinear Anal.* 5(4) (2022), 459–472. 10.53006/rna.1121916.
- [5] A. El Mfadel, S. Melliani and M. Elomari, Existence and uniqueness results for Ψ -Caputo fractional boundary value problems involving the p-Laplacian operator, *Politehn. Univ. Bucharest Sci. Bull. Ser. A Appl. Math. Phys.* 84(1) (2022), 37–46.

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 34A08, 26A33, 35R09, 65L20.

Key words and phrases. Tempered ψ -fractional integral, Tempered Ψ -Caputo fractional derivative, Finite difference method, Piecewise linear interpolation.

(S. Baroudi) SULTAN MOULAY SLIMANE UNIVERSITY, LABORATORY OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING, 23000, BENI MELLAL, MOROCCO
Email address, S. Baroudi: samibaroudi.fstb@gmail.com

(M. Elomari) SULTAN MOULAY SLIMANE UNIVERSITY, LABORATORY OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING, 23000, BENI MELLAL, MOROCCO
Email address, M. Elomari: m.elomari@usms.ma

(A. El MFadel) SULTAN MOULAY SLIMANE UNIVERSITY, LABORATORY OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING, 23000, BENI MELLAL, MOROCCO
Email address, A. El MFadel: a_elfadel@usms.ma

(A. Kassidi) SULTAN MOULAY SLIMANE UNIVERSITY, LABORATORY OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING, 23000, BENI MELLAL, MOROCCO
Email address, A. Kassidi: abderrazakassidi@gmail.com

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 81-82

SOLVABILITY OF A SYSTEM OF THIRD-ORDER DIFFERENCE EQUATIONS

Ş. DEVECIOĞLU AND M. KARA

0009-0003-0706-5421 and 0000-0001-8081-0254

ABSTRACT

In this study, we investigate the following four-dimensional system of difference equations

$$\begin{cases} u_n = \frac{\alpha u_{n-3} t_{n-2} + \beta}{\gamma v_{n-1} t_{n-2} u_{n-3}}, \\ v_n = \frac{\alpha v_{n-3} u_{n-2} + \beta}{\gamma w_{n-1} u_{n-2} v_{n-3}}, \\ w_n = \frac{\alpha w_{n-3} v_{n-2} + \beta}{\gamma t_{n-1} v_{n-2} w_{n-3}}, \\ t_n = \frac{\alpha t_{n-3} w_{n-2} + \beta}{\gamma u_{n-1} w_{n-2} t_{n-3}}, \end{cases} n \in \mathbb{N}_0,$$

where the initial values u_{-k} , v_{-k} , w_{-k} , t_{-k} , $k \in \{1, 2, 3\}$, and the parameters α , β , and γ are real numbers. The solutions of aforementioned system are obtained in explicit form. In addition, we examine the solutions according to some special cases of the parameters. Finally, numerical examples are given to demonstrate the theoretical results.

REFERENCES

- [1] Y. Halim and J. F. T. Rabago, On the solutions of a second-order difference equation in terms of generalized Padovan sequences, *Mathematica Slovaca*, 68(3), 625-638 (2018). <https://doi.org/10.1515/ms-2017-0130>
- [2] M. Kara and Y. Yazlik, Solutions formulas for three-dimensional difference equations system with constant coefficients, *Turkish Journal of Mathematics and Computer Science*, 14(1) 107-116 (2022). <https://doi.org/10.47000/tjmcs.1060075>
- [3] M. Kara, Solvability of a three-dimensional system of non-linear difference equations, *Mathematical Sciences and Applications E-Notes*, 10(1), 1-15, (2022). <https://doi.org/10.36753/mathenot.992987>
- [4] M. Kara and Y. Yazlik, On a solvable system of difference equations via some number sequences, *International Journal of Nonlinear Analysis and Applications*, 13(2) 2611-2637 (2022). <https://doi.org/10.22075/IJNAA.2022.26918.3451>
- [5] M. Kara and Y. Yazlik, Solvable three-dimensional system of higher-order nonlinear difference equations, *Filomat*, 36(10) 3453-3473 (2022). <https://doi.org/10.2298/FIL2210449K>

Date: July, 8, 2023.

Key words and phrases. Periodicity, Solution, System of difference equation.

- [6] S. Stević, Representation of solutions of bilinear difference equations in terms of generalized Fibonacci sequences, *Electronic Journal of Qualitative Theory of Differential Equations*, 67, 1-15 (2014).
- [7] Y. Yazlik, D.T. Tollu and N. Taskara, On the solutions of difference equation systems with Padovan numbers, *Appl. Math.*, 4, 15-20 (2013). <https://doi.org/10.4236/am.2013.412A1002>

(Şule Devecioglu) KARAMANOĞLU MEHMETBEY UNIVERSITY, DEPARTMENT OF MATHEMATICS, 70100, KARAMAN, TURKEY
Email address, Şule Devecioglu: suldevec123036@gmail.com

(Merve Kara) KARAMANOĞLU MEHMETBEY UNIVERSITY, DEPARTMENT OF MATHEMATICS, 70100, KARAMAN, TURKEY
Email address, Merve Kara: mervokara@kmu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 83-84

PROPERTIES OF GENERALIZED SEMI CLOSED SETS IN THE TOPOLOGY

H.TAŞKIRAN AND A. ERCİYES

0000-0001-9864-8064 and 0000-0002-0942-5182

ABSTRACT

Levine [3, 4] introduced semi-closed sets in 1963 and generalized closed sets in topology in 1970. There are many studies in the literature about generalized open sets, generalized closed sets, and their properties [2, 5]. After, Bhattacharyya et al. [1] were introduced the concepts of generalized semi closed sets using semi closure to characterize the s -normality axiom in 1990. If (X, τ) is a topological space and $A \subset X$, then A is called generalized closed if $\bar{A} \subset U$ whenever $A \subset U$ and $U \in \tau$, where \bar{A} is semi closure of A . If semi closed is taken instead of usual closed and semi closure is taken instead of usual closure in this definition, we obtained the generalized semi closed (in brief, gs - closed) set concept.

In this paper, we found the various papers in the field of gs - closed sets. We used these sets to study the notions like gs - closure operators, gs -closed mappings, gs - regular, and gs - normal spaces.

REFERENCES

- [1] P. Bhattacharyya, and B. K. Lahiri, Semi generalized closed sets in topology, Indian J. Pure Appl. Math., 29, pp. 375–382, (1987).
- [2] R. Devi, H. Maki, and K. Balachandran, semi generalized homeomorphisms and generalized semi homeomorphisms in topological spaces, Indian J. Pure Appl. Math., 26 (3), pp. 271–284, (1995).
- [3] N. Levine, Semiopen sets and semi continuity in topological spaces, Amer. Math. Montly, 70, pp. 36–41 (1963).
- [4] N. Levine, Generalized closed sets in topological spaces, Rend. Circ. Mat. Palermo, 19, pp. 89–96, (1970).
- [5] P. Sundaram, Generalizations of continuous maps in topological spaces, Ph.D Thesis, Bharatiyar Univ. Coimbatore, (1991).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 54A05, 54B05; 54C08, 54D10.

Key words and phrases. Semiopen sets, Semiclosure, gs -closed sets, gs -continuity, gs -closed functions.

(author one) AKSARAY UNIVERSITY, MATHEMATICS DEPARTMENT, 68100, AKSARAY, TURKEY
Email address, author one: havva.ercan7@gmail.com

(author two) AKSARAY UNIVERSITY, MATHEMATICS DEPARTMENT, 68100, AKSARAY, TURKEY
Email address, author two: ayhanerciyes@aksaray.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 85

EXISTENCE THEOREMS FOR SET-VALUED OPERATORS IN WC-BANACH ALGEBRAS

CESİM TEMEL AND MÜBERRA SELAH

0000-0002-9015-4155 and 0000-0001-6218-398X

ABSTRACT

In this work, we aim to establish suitable conditions that will ensure the existence of the solution for set-valued operator equations in WC-Banach algebras. We present some new set-valued existence theorems under these conditions. Finally, to prove these results, we used the measure of weak non-compactness technique and generalized D-Lipschitzian.

REFERENCES

- [1] J. Banas, M.A. Taoudi, Fixed points and solutions of operator equations for the weak topology in Banach algebras, Taiwanese J. Math., 3, 871-893, (2014).
- [2] A. Jeribi, B. Krichen, B. Mefteh, Fixed point theory in WC-Banach algebras, Turk. J. Math., 40, 283-291, (2016).
- [3] C.Temel , Multivalued types of Krasnosel'skii's fixed point theorem for weak topology. U.P.B. Sci. Bull., Series A, (2) 81, 139 148, (2019).

(Cesim Temel) VAN YUZUNCU YIL UNIVERSITY, DEPARTMENT OF MATHEMATICS, 65080, VAN, TURKEY.

Email address: cesimtemel@yyu.edu.tr

(Müberra Selah) VAN YUZUNCU YIL UNIVERSITY, DEPARTMENT OF MATHEMATICS, 65080, VAN, TURKEY

Email address: muberra.selah@gmail.com

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 34K13, 47H04, 47H10.

Key words and phrases. Set-valued operator, D-Lipschitzian, Measure of weak noncompactness, WC-Banach Algebras.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 86-87

**NOVEL INEQUALITIES FOR GENERALIZED FRACTIONAL
INTEGRALS APPLIED TO SYNCHRONIZED CONVEX
FUNCTIONS**

ABDULLAH AKKURT AND HÜSEYİN YILDIRIM

0000-0001-5644-1276 and 0000-0001-8855-9260

ABSTRACT

In this article, we demonstrated that the product of two synchronized convex functions is also synchronized convex. Subsequently, utilizing this convexity property, we derived new fractional integral inequalities. These inequalities were extended using the generalized Riemann-Liouville fractional integral. In our study, we discovered and proved these inequalities, which support the existing results in the literature.

REFERENCES

- [1] Akkurt, A., Yıldırım, M. E., and Yıldırım, H. (2016). On some integral inequalities for (k, h) -Riemann-Liouville fractional integral. *New Trends in Mathematical Sciences*, 4(2), 138-146.
- [2] Belarbi, S., and Dahmani, Z. (2009). On some new fractional integral inequalities. *J. Inequal. Pure Appl. Math*, 10(3), 1-12.
- [3] Dahmani, Z. (2010). New inequalities in fractional integrals. *Int. J. Nonlinear Sci*, 9(4), 493-497.
- [4] Ünlüyol, E., Erdaş, Y., and Salaş, S. Operator (α, m) -convex functions and applications for synchronous and asynchronous functions. *Mathematical Sciences and Applications E-Notes*, 7(2), 225-236.
- [5] Sarikaya, M. Z., Dahmani, Z., Kiris, M. E., and Ahmad, F. (2016). (k, s) -Riemann-Liouville fractional integral and applications. *Hacettepe Journal of Mathematics and Statistics*, 45(1), 77-89.
- [6] Oldham, K., and Spanier, J. (1974). *The fractional calculus theory and applications of differentiation and integration to arbitrary order*. Elsevier.
- [7] Skala, H. (1998). On the characterization of certain similarly ordered super-additive functionals. *Proceedings of the American Mathematical Society*, 126(5), 1349-1353.
- [8] Samko, S. G., Kilbas, A. A., and Marichev, O. I. (1993). *Fractional Integrals and Derivatives, Theory and Applications*, Gordon and Breach Sci. Publishers, Yverdon.

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 53A04, 53A05.

Key words and phrases. Fractional Integral, Convex Functions, Riemann-Liouville Fractional Integral.

NOVEL INEQUALITIES FOR GENERALIZED FRACTIONAL INTEGRALS APPLIED TO SYNCHRONIZED CONVEX FUNCTION

(A. Akkurt) KAHRAMANMARAŞ SÜTÇÜ İMAM UNIVERSITY, DEPARTMENT OF MATHEMATICS,
FACULTY OF SCIENCE, 46100, KAHRAMANMARAŞ, TURKEY
Email address, A. Akkurt: abdullahmat@gmail.com

(H. Yildirim) KAHRAMANMARAŞ SÜTÇÜ İMAM UNIVERSITY, DEPARTMENT OF MATHEMATICS,
FACULTY OF SCIENCE, 46100, KAHRAMANMARAŞ, TURKEY
Email address, H. Yildirim: hyildi@ksu.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 88

**TOTALLY UMBILICAL SEMI-INVARIANT SUBMANIFOLDS OF
POLY-NORDEN MANIFOLDS**

ŞERİFE NUR BOZDAĞ

ABSTRACT

In this study, semi-invariant submanifolds of poly-Norden manifolds are introduced. Particularly in totally umbilical semi-invariant submanifolds, distributions that are orthogonal complement to each other in the tangent bundle are discussed. The integrability and total geodesic foliation conditions of these distributions were obtained.

REFERENCES

- [1] B. Şahin, Almost Poly-Norden Manifolds, International Journal of Maps in Mathematics, 1(1), 68–79, (2018).
- [2] F. E. Erdoğan, C. Yıldırım, C., On a Study of the Totally Umbilical Semi-Invariant Submanifolds of Golden Riemannian Manifolds, Politeknik Dergisi, 21(4), 967-970, (2018), DOI: 10.2339/politeknik.389629
- [3] S. Yüksel Perktaş, Submanifolds of Almost Poly-Norden Riemannian Manifolds, Turkish Journal of Mathematics, 44(1), 31–49, (2020).
- [4] V. Ayhan, S. Yüksel Perktaş, Slant submanifolds of almost poly-Norden Riemannian Manifolds, International Journal of Maps in Mathematics, 6(1), 22–36, (2023).

EGE UNIVERSITY, MATHEMATICS DEPARTMENT, 35100, İZMİR, TÜRKİYE
Email address, author one: serife.nur.yalcin@ege.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 53C15; 53C40.

Key words and phrases. Totally umbilical submanifolds, Almost poly-Norden structure, Poly-Norden manifold.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 89-90

ON k -CONFORMABLE FRACTIONAL OPERATORS

SÜMEYRA ERMEYDAN ÇİRİŞ AND HÜSEYİN YILDIRIM

ABSTRACT. In this study, we define the left and right fractional k -conformable integrals and derivatives. Furthermore, we obtained the fractional k -conformable derivatives of functions associated with some spaces and express their properties.

REFERENCES

- [1] Jarad, F., Uğurlu, E., Abdeljawad, T., Baleanu, D., On a new class of fractional operators, *Advance in Difference Equations*, 247-(2017)
- [2] Diethelm, K., *The Analysis of Fractional Differential Equations*, Lecture Notes in Mathematics, (2010)
- [3] Hilfer, R., *Applications of Fractional Calculus in Physics*, Word Scientific, Singapore, (2000)
- [4] Kilbas, A., Srivastava, H.M., Trujillo, J.J., *Theory and Application of Fractional Differential Equations*, North-Holland Mathematics Studies, vol. 204 (2006)
- [5] Magin, R.L., *Fractional Calculus in Bioengineering*, Begell House Publishers, Redding, (2006)
- [6] Podlubny, I., *Fractional Differential Equations*, Academic Press, San Diego, (1999)
- [7] Samko, S.G., Kilbas, A.A., Marichev, O.I., *Fractional Integrals and Derivatives: Theory and Applications*, Gordon & Breach, Yverdon, (1993)
- [8] Katugampola, U.N., New approach to generalized fractional integral, *Appl. Math. Comput.*, 218, 860-865, (2011)
- [9] Katugampola, U.N., A new approach to generalized fractional derivatives, *Bull. Math. Anal. Appl.*, 6, 1-15, (2014)
- [10] Abdeljawad, T., On conformable fractional calculus, *J.Comput. Appl. Math.*, 279,57-66, (2015)
- [11] Kilbas, A.A., Hadamard type fractional calculus, *J. Korean Math. Soc.* 38, 1191-1204, (2001)
- [12] Gambo, Y.Y., Jarad, F., Abdeljawad, T., Baleanu, D., On Caputo modification of the Hadamard fractional derivate. *Adv. Differ.Equ.*, 2014, 10 (2014)
- [13] Jarad, F., Abdeljawad, T., Baleanu, D., Caputo-type modification of the Hadamard fractional derivative, *Adv. Differ. Equ.*, 2012, 142 (2012)
- [14] Adjabi, Y., Jarad, F., Baleanu, D., Abdeljawad, T., On Cauchy problems with Caputo Hadamard fractional derivatives, *J.Comput. Anal. Appl.*, 21(1), 661-681 (2016)
- [15] Jarad, F., Abdeljawad, T., Baleanu, D., On the generalized fractional derivatives and their Caputo modification. *J., Nonlinear Sci. Appl.*, 10(5), 2607-2619 (2017).
- [16] Yıldırım, H., Kırtay, Z., Ostrowski Inequality for Generalized Fractional Integral and Related Inequalities, *Malaya Journal of Matematik*, (2) 3, 322-329(2014).

Date: July, 8, 2023.

2010 Mathematics Subject Classification. 26A33, 26D15, 41A55.

Key words and phrases. Conformable derivatives, fractional conformable integrals, Fractional conformable derivatives .

DEPARTMENT OF MATHEMATICS, FACULTY OF SCIENCE AND ARTS, UNIVERSITY OF KAHRAMANMARAŞ
SÜTÇÜ İMAM, 46100, KAHRAMANMARAŞ, TURKEY
Email address: sumeyye_ermeydan@hotmail.com hildir@ksu.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 91-92

SIGN LANGUAGE RECOGNITION MOBILE APPLICATION FOR TURKISH LANGUAGE

ERDEM DEMİROĞLU, FURKAN AYAKDAS, ASUDE TANRIBUYURDU,
AND GULSUM AKKUZU KAYA

0000-0003-1806-7759

ABSTRACT

Sign language is a common and reliable way of communicating with deaf and dumb people. This language can be done anywhere around the world however most people do not know and understand sign language. When people do not understand that special group of people, they either try to isolate themselves from the community or they get angry. In order to overcome that type of problem, sign language applications have been developed which help deaf and dumb people to convey their ideas to others. Sign language tools simply convert sign language into text in real-time. This research aims to develop a mobile application that converts sign language into text for the Turkish Language. This research focuses on the accuracy of the recognition. Our Application resulted in 96,3% accuracy for three words.

REFERENCES

- [1] ERTEN, H., and ARICI, N. (2022). İşaret dilinin tarihi serüveni ve Türk İşaret Dili. Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi, 24(1), 1-14.
- [2] Pfau, R. (2012). Sign language. M. Steinbach, and B. Woll (Eds.). De Gruyter Mouton.
- [3] Bayazit M, Couture-Beil A, Mori G. Real-time Motion-based Gesture Recognition Using the GPU. In: MVA. Citeseer; 2009. p. 9-12.
- [4] Zeineb A, Chaala C, Frikha T, Hadriche A. Hand gesture recognition system. International Journal of Computer Science and Information Security (IJCSIS). 2016;14(6).
- [5] Zengeler N, Kopinski T, Handmann U. Hand gesture recognition in automotive human machine interaction using depth cameras. Sensors. 2018;19(1):59.
- [6] Nivedita S, Ramyapriya Y, Tanmaya H, et al. Sign Language Recognition System using Machine Learning. 2022.
- [7] Kadhim RA, Khamees M. A real-time American sign language recognition system using convolutional neural network for real datasets. TemJournal. 2020;9(3):937.
- [8] Pigou L, Dieleman S, Kindermans PJ, Schrauwen B. Sign language recognition using convolutional neural networks. In: European conference on computer vision. Springer; 2014. p. 572-8

Date: July, 8, 2023.

Key words and phrases. Sign language recognition, Turkish Sign Language, Hand Gesture recognition, LSTM.

- [9] Zulkarnain Iyw. Indonesian Sign Language Converter Into Text and Voice As Social Interaction Tool For Inclusion Student In Vocational High Schools. Conference on Electro Information Technology (EIT). IEEE; 2021. p. 188-92
- [10] Chavan S, Yu X, Saniie J. Convolutional Neural Network Hand Gesture Recognition for American Sign Language. In: 2021 IEEE International Conference on Electro Information Technology (EIT). IEEE; 2021. p. 188-92
- [11] Obi, Y., Claudio, K. S., Budiman, V. M., Achmad, S., and Kurniawan, A. (2023). Sign language recognition system for communicating to people with disabilities. *Procedia Computer Science*, 216, 13-20.

(author one) COMPUTER ENGINEERING, FACULTY OF ENGINEERING AND ARCHITECTURE, RECEP TAYYIP ERDOGAN UNIVERSITY, RIZK, TURKIYE
Email address, author one: erdemdemiroglu138@gmail.com

(author two) COMPUTER ENGINEERING, FACULTY OF ENGINEERING AND ARCHITECTURE, ISPARTA UYGULAN ALI PAZILCI UNIVERSITY, ISPARTA, TURKIYE
Email address, author two: furkanayakdas@gmail.com

(author three) COMPUTER ENGINEERING, FACULTY OF ENGINEERING AND ARCHITECTURE, KIRSEHIR AHI EVRAN UNIVERSITY, KIRSEHIR, TURKIYE
Email address, author three: asudetb@gmail.com

(author four) COMPUTER ENGINEERING, FACULTY OF ENGINEERING AND ARCHITECTURE, KIRSEHIR AHI EVRAN UNIVERSITY, KIRSEHIR, TURKIYE
Email address, author four: gulsum.akkuzukaya@ahievran.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 93-94

QUALITY CLASSIFICATION OF CERAMIC SANITARYWARE PRODUCTS WITH MACHINE LEARNING TECHNIQUES

SEDANUR ŞİMŞEK AND ERDENER ÖZÇETİN

ABSTRACT

Ceramic products have a wide range of applications in industry due to their properties such as high temperature resistance, high hardness and corrosion resistance. On the other hand, many factors can influence the production process of ceramic products and managing the quality control process can be challenging. Machine learning methods are widely used in classification and prediction problems, in the ceramic industry. In this study, we focus on the quality classification of products using data from a large-scale ceramic sanitary ware manufacturing plant. For this real-life problem, there are two classes in terms of quality depending on the data used. For the two-class problem, several machine learning methods were used to build models and discussions were made on the results obtained.

REFERENCES

- [1] Ramesh, P., and Mani, K. (2022). Prediction of surface roughness using machine learning approach for abrasive waterjet milling of alumina ceramic. *The International Journal of Advanced Manufacturing Technology*, 119(1-2), 503-516.
- [2] Qu, N., Liu, Y., Liao, M., Lai, Z., Zhou, F., Cui, P., ... & Zhu, J. (2019). Ultra-high temperature ceramics melting temperature prediction via machine learning. *Ceramics International*, 45(15), 18551-18555.
- [3] Ye, Y., Ni, Z., Hu, K., Li, Y., Peng, Y., & Chen, X. (2023). Dielectric constant prediction of perovskite microwave dielectric ceramics via machine learning. *Materials Today Communications*, 35, 105733.
- [4] Chen, T., Wu, W., Li, W., & Liu, D. (2019). Laser cladding of nanoparticle TiC ceramic powder: Effects of process parameters on the quality characteristics of the coatings and its prediction model. *Optics & Laser Technology*, 116, 345-355.
- [5] European Commission. (2007). Reference document on best available techniques in the ceramic manufacturing industry. *Ceram. Manuf. Ind.*, 210-211.
- [6] Canduran, K., & Ural, M. (2019). Seramik Sağlık Gereçleri Üretiminde Deformasyonu Önlemek İçin Kullanılan Aparatlar. *Akademik Sanat*, (8).
- [7] Kunduracı, N., Binal, G., & Şimşek, İ. N. G. (2017). Seramik Sağlık Gereçleri Fine Fire Clay Ürünlerde Şamot Alternatifi Malzemelerin Kullanımının Araştırılması ve Sentezlenmesi. *Afyon Kocatepe Üniversitesi Fen Ve Mühendislik Bilimleri Dergisi*, 17(1), 203-208.

Date: July, 8, 2023.

- [8] Bernasconi, A., Pellegrino, L., Vergani, F., Campanale, F., Mariani, N. M., Galimberti, L., ... & Capitani, G. (2023). Recycling detoxified cement asbestos slates in the production of ceramic sanitary wares. *Ceramics International*, 49(2), 1836-1846.
- [9] Epa, U. (1995). AP-42: Compilation of Air Emissions Factors. Research Triangle Park NC: US Environmental Protection Agency.
- [10] Cultrone, G., & Madkour, F. (2013). Evaluation of the effectiveness of treatment products in improving the quality of ceramics used in new and historical buildings. *Journal of Cultural Heritage*, 14(4), 304-310.
- [11] Coskun, H., Yigit, T., & Üner, İ. S. (2022). Integration of digital quality control for intelligent manufacturing of industrial ceramic tiles. *Ceramics International*, 48(23), 34210-34233.
- [12] Zhao, Z. (2021). Review of non-destructive testing methods for defect detection of ceramics. *Ceramics International*, 47(4), 4384-4397.
- [13] Cristianini N, Shawe-Taylor J. An introduction to support vector machines and other kernel-based learning methods. Cambridge: Cambridge University Press; 2000.
- [14] Scholkopf B, Smola A. Learning with kernels: support vector machines, regularization, optimization, and beyond. Cambridge, MA: MIT Press; 2002.
- [15] Breiman L et al. Classification and regression trees. Belmont, CA: Wadsworth; 1984.
- [16] Quinlan R. 14.5. programs for machine learning. Los Altos, CA: Morgan Kaufmann; 1993.

(Sedanur Şimşek) HITIT UNIVERSITY, INDUSTRIAL ENGINEERING, CORUM, TURKEY
Email address: sedanursimsek3@gmail.com

(Erdener Özçetin) HITIT UNIVERSITY, INDUSTRIAL ENGINEERING, CORUM, TURKEY
Email address: eozcetin@gmail.com

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 95-96

BEST APPROXIMATION OF FIXED POINT RESULTS IN GENERALIZED METRIC SPACES

NESRİN MANAV TATAR

0000-0002-0769-9374

ABSTRACT

In 1979[26], Takahashi provided examples of convex structures in metric spaces that were not embedded in a Banach space, prompting further exploration in this area. Then, in 2012[14], the authors introduced subcompatibility and subsequential continuity concepts to prove common fixed point theorems in metric and convex metric spaces, along with related theorems on best approximation. Finally, in 2021, the authors presented a modified version of their theorem, building upon their earlier work[25]. We hereby present an introduction to a congruous concept, albeit within diverse types of metric spaces.

REFERENCES

- [1] Aamri M, El Moutawakil D: *Some new common fixed point theorems under strict contractive conditions*, J. Math. Anal. Appl. (2002), 270: 181–188. 10.1016/S0022-247X(02)00059-8
- [2] U. Jungck, *Commuting mappings and fixed point*, Am. Math. Mon. 83, 261-263, (1976).
- [3] A. Branciari, *A fixed point theorem for mappings satisfying a general contractive condition of integral type*, Int. J. Math. Math. Sci. 29 (2002), 531–536.
- [4] Berinde, V. and Pacurar, M. *Existence and Approximation of Fixed Points of Enriched Contractions and Enriched κ -Contractions*, Symmetry (2021), 13, 498. <https://doi.org/10.3390/sym13030498>
- [5] S. Sessa, *On a weak commutativity conditions of mappings in fixed point consideration* Publ. Inst. Math. (Belgr.), (1982), 32, 146-153.
- [6] U. Jungck, *Compatible mappings and common fixed points* Int. J. Math. Math. Sci., (1986), 11, 771-779.
- [7] P. Vijayaraju, B.E. Rhoades, R. Mohanra, *A fixed point theorem for a pair of maps satisfying a general contractive condition of integral type*, Int. J. Math. Math. Sci., (2005), 15, 2359-2364.
- [8] V. V. Chistyakov, *Metric Modular Spaces Theory and Applications*, SpringerBriefs in Mathematics, ISSN 2191-8198(electronic) Library of Congress Control Number: 2015956774 **73** (2015), DOI 10.1007/978-3-319-25283-4

Date: July, 8, 2023.

2010 Mathematics Subject Classification. 54H25, 47H10.

Key words and phrases. Fixed point theorem, Generalized metric space.

- [9] O'Regan, D. and Shahzad, N. *Approximation and fixed point theorems for countable condensing composite maps*, Bulletin of the Australian Mathematical Society, Volume 68, Issue 1, August (2003), pp. 161 - 168 DOI: <https://doi.org/10.1017/S0004972700037515>
- [10] Hussain, N., O'Regan, D. and Agarwal, R.P., *Common Fixed Point And Invariant Approximation Results On Non-Starshaped Domains*, Georgian Mathematical Journal Volume 12 (2005), Number 4, 659-669.
- [11] Hussain, N., and Cho, Y.J., *Weak Contractions, Common Fixed Points, and Invariant Approximations*, Hindawi Publishing Corporation Journal of Inequalities and Applications, (2009), ID 390634, doi:10.1155/2009/390634.
- [12] A. Razani, R. Moradi, *Common fixed point theorems of integral type in modular spaces*, Bull. Iran. Math. Soc. (2008), 35, 11-24.
- [13] Azadifar, B., Sadeghi, U., Saadati, R. and Park, C., *Integral type contractions in modular metric spaces*, Journal of Inequalities and Applications 2013, (2013):483
- [14] Rouzkard, F., Joudae, M. and Nashine, H.K., *New common fixed point theorems and invariant approximation in convex metric spaces*, Bull. Belg. Math. Soc. Simon Stevin 19 (2012), 311-328.
- [15] M. Jleli and B. Samet, *A Ueneralized Metric Space and Related Fixed Point Theorems*, Fixed Point Theory and Appl., (2015):61), 14(2015).
- [16] Maqbi, S.H. *Best approximation in metric space for contractive mapping of integral type and Applications of fixed point to Approximation theory*, (2014) J. Coll. basic Educ. 20(84)
- [17] Ben-El-Mechaiekh, H. *Spaces and maps approximation and fixed points*, Journal of Computational and Applied Mathematics 113 (2000) 283-308
- [18] Khatoon, S. Uddin, I. and Baleanu, D. *Approximation of fixed point and its application to fractional differential equation*, Journal of Applied Mathematics and Computing (2021) 66:507-525 <https://doi.org/10.1007/s12190-020-01445-1>
- [19] Khan, L.A. and Khan, A.R., *An Extension of Brosowski-Meinardus Theorem on Invariant Approximation* Approx. Theory and its Appl., (11:4;1995), 12(1995).
- [20] B. Rhoades, *Two fixed-point theorems for mappings satisfying a general contractive condition of integral type* IJMMS (2003:63), 4007-4013 DOI: 10.1155/S0161171203208024.
- [21] Turkoglu, D. and Manav, N. *Fixed Point Theorems in New Type of Modular Metric Spaces*, Fixed Point Theory and Applications(2018), <https://doi.org/10.1186/s13663-018-0650-3>.
- [22] Manav, N., Turkoglu, D. and Abdeljawad, T. *Common Fixed Point Results For General Contractive Inequality of Integral Type on generalized modular metric space*, Fourth International Conference of Mathematical Sciences (ICMS 2020) AIP Conf. Proc. 2334, 050002-1-050002-4; (2021) <https://doi.org/10.1063/5.0042239>
- [23] Kerim, H., Shatanawi, W., and Tallafha, A. *Common Fixed Point Theorems Via Integral Type Contraction In Modular Metric Space*, G.P.B. Sci. Bull., Series A, Vol. 83, Iss. 3, (2021), <https://doi.org/10.1186/s13663-018-0650-3>.
- [24] Gupta, V, Mani, N and Ulati, N, *A common fixed point theorem satisfying contractive condition of integral type*, IJREAS, Vol 2, Issue 2 (2012), 2249-3905.
- [25] Kumar, A.; Tas, A. *Note on Common Fixed Point Theorems in Convex Metric Spaces*, Axioms (2021), 10, 28. <https://doi.org/10.3390/axioms10010028>
- [26] Takahashi, W. *A Convexity in Metric Space And Nonexpansive Mappings*, I Kodai Math. Sem. Rep. 22 (1970), 142-149
- [27] Yuan, G.X., *Fixed Point Theorem and Related Nonlinear Analysis by the Best Approximation Method in p-Vector Spaces*, Numerical Functional Analysis and Optimization, 44:4, 221-295, DOI: 10.1080/01630563.2023.2167088.
- [28] Oaleru, J.O., *Approximation of common fixed points of weakly compatible pairs using the Jungck iteration*, Applied Mathematics and Computation 217 (2011) 8425-8431

NESRIN MANAV TATAR(N.MANAV), DEPARTMENT OF MATHEMATICS, ERZINCAN BINALI YILDIRIM UNIVERSITY, FACULTY OF ARTS & SCIENCES, ERZINCAN, TURKEY
 Email address: nesrinmanav2@gmail.com, nmanav@erzincan.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 97

SOME FIXED POINT APPLICATIONS OF F-MODULAR METRIC

NESRİN MANAV TATAR, ZEHRA DOĞAN, DURAN TURKOĞLU

0000-0002-0769-9374, 0000-0001-7027-8508 and 0000-0002-8667-1432

ABSTRACT

In this paper, we provide several demonstrations of fixed point theorems within the framework of F-metric modular spaces, which were previously introduced and defined as a means of conceptualizing modular metrics[3]. Additionally, we propose a novel approach to the Banach contraction principle specifically tailored for F-metric spaces[1]. Our research focuses on establishing various coincidence and common fixed point theorems within the realm of F-metric spaces[2].

REFERENCES

- [1] D. Binbaşıoğlu *Coincidence and common fixed point theorems in F-metric spaces*, DOI: <https://doi.org/10.46291/ICONTECHvol4iss3pp43-49> (December 2020).
- [2] N. Manav, and D. Turkoglu *Common fixed point results on modular F- metric spaces*, AIP Conference Proceedings 2183, 060006 (2019); <https://doi.org/10.1063/1.5136161>.
- [3] V. V. Chistyakov, *Metric Modular Spaces Theory and Applications*, SpringerBriefs in Mathematics, ISSN 2191-8198(electronic) Library of Congress Control Number: 2015956774 73, (2015), DOI 10.1007/978-3-319-25283-4

NESRİN MANAV TATAR(N.MANAV), DEPARTMENT OF MATHEMATICS, ERZINCAN BINALI YILDIRIM UNIVERSITY, FACULTY OF ARTS & SCIENCES, ERZINCAN, TURKEY,
Email address: nesrinmanav2@gmail.com, nmanav@erzincan.edu.tr

ZEHRA DOĞAN,, DEPARTMENT OF MATHEMATICS, ERZINCAN BINALI YILDIRIM UNIVERSITY, FACULTY OF ARTS & SCIENCES, ERZINCAN, TURKEY
Email address: zehraozdendogan@gmail.com

DURAN TURKOĞLU, DEPARTMENT OF MATHEMATICS, GAZI UNIVERSITY, FACULTY OF SCIENCE, ANKARA, TURKEY
Email address: dturkoglu@gazi.edu.tr

Date: July, 8, 2023.

2010 Mathematics Subject Classification. 54H25, 47H10.

Key words and phrases. F-metric, modular metric, Fixed point theorem, Generalized metric space.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 98-99

OPEN-LOOP CONTROL VS CLOSED-LOOP CONTROL IN SMART IRRIGATION: A GAME THEORETICAL PERSPECTIVE

A. HAMIDOĞLU

0000-0003-3584-8848

ABSTRACT

This paper examines a decision-making problem involving the selection of open-loop versus closed-loop control for smart irrigation in agriculture by using game theory. In this regard, the use of open-loop control in addition to closed-loop control will be evaluated by a number of parameters in terms of their economic framework. For this reason, a game theoretical platform will be established for two farmers in the field, one of whom uses open-loop control and the other uses closed-loop control for agricultural irrigation. The goal of the study is to determine which type of control results in greater economic and sustainable gains in agriculture. Using the grey wolf optimizer, numerical experiments are conducted based on a sample table of parameter values for each control structure, from which decision-making processes are derived.

REFERENCES

- [1] A. Hamidoğlu, Designing discrete-time control-based strategies for pursuit-evasion games on the plane, submitted, pp.1-28 (2023).
- [2] A. Hamidoğlu, A game theoretical approach for finding near-optimal solutions of an optimization problem, Optimization, pp.1-23 (2022).
DOI number: 10.1080/02331934.2022.2069024
- [3] A. Hamidoğlu, M.H. Taghiyev, G.W. Weber, On construction of pursuit-evasion games in discrete control models, Applied and Computational Mathematics, Vol.21, N.1, pp.52-60 (2022).
DOI number: 10.30546/1683-6154.21.1.2022.52
- [4] A. Hamidoğlu, A novel one target game model in the life insurance market, International Journal of Management Science and Engineering Management, Vol.16, N.3, pp.221-228 (2021).
DOI number: 10.1080/17509653.2021.1941370
- [5] A. Hamidoğlu, M.H. Taghiyev, On discrete game models with applications to management, Lecture Notes on Data Engineering and Communications Technologies, Vol.78, Springer, Cham, pp.195-207 (2021).
DOI number:10.1007/978-3-030-79203-9_15

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 91Axx; 93Cxx.

Key words and phrases. Open-loop control, Close-loop control, Irrigation, Agriculture, Evolutionary game, Grey wolf optimizer.

- [6] A. Hamidođlu, M.H. Taghiyev, G.W. Weber, On building two-layer games with treatment schedules for the SIR model, *Azerbaijan J. Math.*, Vol.11, N.2, pp.183-195 (2021).

BAHÇEŞEHİR UNIVERSITY, MATHEMATICS DEPARTMENT, 34353, İSTANBUL, TÜRKİYE
Email address: ali.hamidoglu@eng.bsu.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 100

FRACTIONAL ECFGFM(1,1) MODEL WITH AN APPLICATION

Ü. ERDİNÇ AND H. BİLGİL

0000-0002-4504-3675 and 0000-0002-8329-5806

ABSTRACT

The grey forecasting models are one of the tools used in the forecasting of time series. It has been one of the popular research areas in recent years due to its low estimation error and practicality in terms of applicability. In addition, fractional grey models have become more desirable than other models, despite the difficulty in calculations, since they give more accurate results than integer order models. The complexities and difficulties in fractional calculations have begun to be overcome owing to new definitions and theorems made in recent years. The new trend in grey modelling is to compose models that are more useful than the previous ones and give results with less error. In this work, a novel fractional grey model derived by using the conformable fractional derivative theory. This new model abbreviated as ECFGFM (1,1). The verification of the method is shown with real data set and it has been shown that the proposed conformable fractional grey model is more effective than the existing models.

REFERENCES

- [1] R. Khalil, M. Al Horani, Y. Abdelrahman and S. Mohammad, A new definition of fractional derivative, *Journal of Computational and Applied Mathematics*, 264, pp. 65–70, (2014).
- [2] X. Ma, W. Wu, B. Zeng, Y. Wang and X. Wu, The conformable fractional grey system model, *ISA Transactions*, 96, pp. 255-271, (2020).
- [3] H. Bilgil, New grey forecasting model with its application and computer code, *AIMS Mathematics*, 6, pp. 1497-1514, (2021).

(author one) AKSARAY UNIVERSITY, MATHEMATICS DEPARTMENT, 68100, AKSARAY, TURKEY
Email address, author one: ummugulsumerdinc@aksaray.edu.tr

(author two) KAYSERİ UNIVERSITY, ENGINEERING FUNDAMENTAL SCIENCES DEPARTMENT, 38000, KAYSERİ, TURKEY
Email address, author two: halisbilgil@kayseri.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 26A33; 00A71.

Key words and phrases. Conformable fractional calculus, Fractional grey model, ECFGFM model.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 101

FRACTIONAL APPROACH TO SOME FUNDAMENTAL CONCEPTS OF SURFACE

AYKUT HAS AND BEYHAN YILMAZ

0000-0003-0658-9365 and 0000-0002-5091-3487

ABSTRACT

In this study, some basic concepts of surfaces are redefined with the help of conformable analysis. Obtained results are compared with classical results. It is stated that which concepts change or do not change with the effect of the conformable derivative. In addition, it is mentioned why the conformable derivative is used and what its advantages are. In order to better understand the results obtained, examples are given and drawings are made with the help of Mathematica.

REFERENCES

- [1] T. Abdeljawad, On Conformable Fractional Calculus, Journal of Computational and Applied Mathematics, 27, 9, pp.57-66 (2015).
- [2] C. Bar, Elementary Differential Geometry, Cambridge University Press, New York, (2010).
- [3] R. Khalil, M. Horani, A. Yousef and M. Sababheh, A New Definition of Fractional Derivative, Journal of Computational and Applied Mathematics, 264, pp.65-70 (2014).
- [4] K. Lazopoulos and A. K. Lazopoulos, Fractional differential geometry of curves and surfaces, Progr. Fract. Differ. Appl., 2, 3, pp.169-186 (2016).
- [5] T. Yajima and K. Yamasaki, Geometry of surfaces with Caputo fractional derivatives and applications to incompressible two-dimensional flows, Journal of Physics A Mathematical and Theoretical, 45, 6, pp.065201 (2012).
- [6] B. Yılmaz and A. Has, Obtaining fractional electromagnetic curves in optical fiber using fractional alternative moving frame, Optik, 260, pp.169067 (2022).

(Aykut Has) KAHRAMANMARAS SUTCU IMAM UNIVERSITY, MATHEMATICS DEPARTMENT, 46100, KAHRAMANMARAS, TURKEY

Email address, Aykut Has: ahas@ksu.edu.tr

(Beyhan Yılmaz) KAHRAMANMARAS SUTCU IMAM UNIVERSITY, MATHEMATICS DEPARTMENT, 46100, KAHRAMANMARAS, TURKEY

Email address, Beyhan Yılmaz: beyhanyilmaz@ksu.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 53A05; 26A33.

Key words and phrases. Surfaces, Fundamental forms, Shape operator, Fractional analysis, Conformable derivative.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 102-103

**FEKETE-SZEGÖ PROBLEM FOR TWO NEW SUBCLASSES OF
BI-UNIVALENT FUNCTIONS DEFINED BY BERNOULLI
POLYNOMIAL**

Y. KORKMAZ AND İ. AKTAŞ

0000-0002-3132-7239 and 0000-0003-4570-4485

ABSTRACT

This investigation deals with two new subclasses of analytic and bi-univalent functions defined by Bernoulli polynomial. In this paper, coefficient estimation and Fekete-Szegő problems are solved for these newly defined function subclasses. In addition, certain remarks are indicated for the subclasses of bi-starlike and bi-convex functions.

REFERENCES

- [1] İ. Aktaş and N. Yılmaz, Initial Coefficients Estimate and Fekete-Szegő Problems for Two New Subclasses of Bi-Univalent Functions, Konuralp J. Math. Vol.10, N.1, pp.138–148 (2022).
- [2] T. Al-Hawary, A. Amourah and B.A. Frasin, Fekete-Szegő inequality for of bi-univalent functions by means of Horadam polynomials, Bol. Soc. Mat. Mex., Vol.27, 1–12 (2021).
- [3] A. Amourah, B.A. Frasin and T. Abdeljawad, Fekete-Szegő inequality for analytic and bi-univalent functions subordinate to Gegenbauer polynomials, J. Funct. Spaces Vol.2021, N.5574673 (2021).
- [4] A. Amourah, B.A. Frasin, M. Ahmad and F. Yousef, Exploiting the Pascal distribution series and Gegenbauer polynomials to construct and study a new subclass of analytic bi-univalent functions. Symmetry, Vol.14, N.1, pp.147 (2022).
- [5] D.A. Brannan and T.S. Taha On some classes of bi-univalent function, Stud.Univ. Babeş-Bolyai Math., Vol.31, pp.70–77 (1986).
- [6] M. Buyankara and M. Çağlar, On Fekete-Szegő Problem For A New Subclass of Bi-Univalent Functions Defined By Bernoulli Polynomials, Acta Univ. Apulensis Math. Inform., Vol.71, pp.137–145 (2022).
- [7] M. Buyankara, M. Çağlar and L.I. Cotîrlă, New Subclasses of Bi-Univalent Functions with Respect to the Symmetric Points Defined by Bernoulli Polynomials, Axioms, Vol.11, pp.652 (2022).
- [8] L.I. Cotîrlă, New classes of analytic and bi-univalent functions, AIMS Math. Vol.6, pp.10642–10651 (2021).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 30C45; 11B68.

Key words and phrases. Bi-univalent function, Coefficient estimates, Fekete-Szegő functional, Bernoulli polynomials.

- [9] J. Dziok, A general solution of the Fekete-Szegő problem, *Bound. Value Probl.*, Vol.2013, N.1, pp.1–13 (2013).
- [10] P.L. Duren, *Univalent functions*, Springer Science and Business Media, (2001).
- [11] M.Fekete and G.Szegő Eine Bemerkung über ungerade schlichte Funktionen, *J. Lond. Math. Soc.*, Vol.1, N.2, pp.85–89 (1933).
- [12] B.A. Frasin and M.K. Aouf, New subclasses of bi-univalent functions, *Appl. Math. Lett.*, Vol.24, pp.1569–1573 (2011).
- [13] H.Ö. Güney, G. Murugusundaramoorthy and J. Sokół, Subclasses of bi-univalent functions related to shell-like curves connected with Fibonacci numbers, *Acta Univ. Sapientiae Math.*, Vol.10, N.1, pp.70–84 (2018).
- [14] M. Lewin, On a coefficient problem for bi-univalent functions, *Proc. Amer. Math. Soc.*, Vol.18, pp.63–68 (1967).
- [15] S.S. Miller and P.T. Mocanu, *Differential Subordinations*, Monographs and Textbooks in Pure and Applied Mathematics, Marcel Dekker, (2000).
- [16] P. Natalini and A. Bernardini, A generalization of the Bernoulli polynomials, *J. Appl. Math.*, Vol.2003, N.3, pp.179–187 (2003).
- [17] H. Orhan, İ. Aktaş and H. Arıkan, On new subclasses of biunivalent functions associated with the (p, q) -Lucas polynomials and bi-Bazilevič type functions of order $\rho + \xi$, *Turk. J. Math.*, Vol.47, N.1, pp.9–109 (2023).
- [18] M. Cops and L.I. Cotîrlă, Coefficient estimates and the Fekete–Szegő problem for new classes of m -fold symmetric bi-univalent functions, *Mathematics*, Vol.10, pp.129, (2022).
- [19] H.M. Srivastava, S. Gaboury and F. Ghanim, Coefficient estimates for some general subclasses of analytic and bi-univalent functions, *Africa Matematika*, Vol.28, pp.693–706 (2017).
- [20] H.M. Srivastava, A.K. Mishra and P. Gochhayat, Certain subclasses of analytic and bi-univalent functions, *Appl. Math. Lett.*, Vol.23, pp.1188–1192 (2010).
- [21] H.M. Srivastava, Ş. Altınkaya and S. Yalçın Certain Subclasses of Bi-Univalent Functions Associated with the Horadam Polynomials, *Iran. J. Sci. Technol. Trans. A Sci.*, Vol.43, pp.1873–1879 (2019).
- [22] H.M. Srivastava, G. Murugusundaramoorthy and K. Vijaya, Coefficient estimates for some families of bi-Bazilevič functions of the Ma-Minda type involving the Hohlov operator, *J. Class. Anal.* Vol.2, N.2, pp.167–181 (2013).
- [23] A.K. Wanas and L.I. Cotîrlă, New Applications of Gegenbauer Polynomials on a New Family of Bi-Bazilevič Functions Governed by the q -Srivastava-Attiya Operator, *Mathematics*, Vol.10, N.8, pp.1309 (2022).
- [24] A.K. Wanas and L.I. Cotîrlă, Initial coefficient estimates and Fekete–Szegő inequalities for new families of bi-univalent functions governed by $(p-q)$ Wanas operator. *Symmetry*, Vol.13, N.11, pp.2118 (2021).
- [25] N. Yılmaz and İ. Aktaş, On some new subclasses of bi-univalent functions defined by generalized Bivariate Fibonacci polynomial, *Africa Matematika*, Vol.33, N.2, pp.59 (2022).
- [26] P. Zaprawa, On the Fekete-Szegő problem for classes of bi-univalent functions, *Bull. Belg. Math. Soc. Simon Stevin*, Vol.21, N.1, pp.169–178 (2014).

(Yunus Korkmaz) KARAMANOĞLU MEHMETBEY UNIVERSITY, KAMİL ÖZDAĞ SCIENCE FACULTY,
DEPARTMENT OF MATHEMATICS, KARAMAN, TÜRKİYE
Email address, Yunus Korkmaz: yunuskorkmaz581@gmail.com

(İbrahim Aktaş) KARAMANOĞLU MEHMETBEY UNIVERSITY, KAMİL ÖZDAĞ SCIENCE FACULTY,
DEPARTMENT OF MATHEMATICS, KARAMAN, TÜRKİYE
Email address, İbrahim Aktaş: aktasibrahim38@gmail.com

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 104-105

GENERALIZED KANTOROVICH-SCHURER-TYPE OPERATORS

NURSEL ÇETİN

ABSTRACT

In this paper, we consider Kantorovich extension of generalized Bernstein-Schurer operator depending on a non-negative integer parameter. We prove approximation theorem in the space of continuous functions and L_p -space. Moreover, we obtain some estimates for the rate of convergence by using modulus of continuity and L_p modulus of smoothness of the first order.

REFERENCES

- [1] F. Altomare, Korovkin-type Theorems and Approximation by Positive Linear Operators, *Surv. Approx. Theory* 5 (2010) 92–164.
- [2] D. Barbosu, The Kantorovich form of Schurer-Stancu operators, *Demonstratio Mathematica*, Vol. XXXVII No 2, (2004).
- [3] Bostancı T. and Başcanbaz-Tunca G. (2022), On Stancu Operators Depending on a Non-Negative Integer, *Filomat* 36:18, 6129–6138.
- [4] J. Bustamante, J. M. Quesada, A property of Ditzian-Totik second order moduli, *Appl. Math. Lett.* 23 (2010) no. 5 576–580.
- [5] N. Çetin, A new generalization of complex Stancu operators, *Math. Methods Appl. Sci.* 42 (2019), 5582-5594.
- [6] N. Çetin, G. Başcanbaz-Tunca, Approximation by a new complex generalized Bernstein operator, *An. Univ. Oradea Fasc. Mat.* 26(2) (2019), 129–141.
- [7] N. Çetin, A new complex generalized Bernstein-Schurer operator, *Carpathian J. Math.* 37 (1) (2021), 81 – 89.
- [8] R.A. DeVore and G.G. Lorentz, *Constructive Approximation*, Springer, Berlin (1993).
- [9] Johnen, H, Inequalities connected with the moduli of smoothness. *Mat. Vesnik*, 9 (24) (1972), 289–303.
- [10] A. Kajla, The Kantorovich variant of an operator defined by D.D Stancu. *Appl. Math. Comput.* 316 (2018), 400–408.
- [11] L.V. Kantorovich, Sur certains développements suivant les polynomes de la forme de S. Bernstein, I, II, *C. R. Acad. Sci. URSS*, pp. 563–568, 595–600, (1930).
- [12] A. Kumar, A new kind of variant of the Kantorovich type modification operators introduced by D. D. Stancu, *Results Appl. Math.* 11 (2021), 100158.
- [13] F. Schurer, *Linear positive operators in approximation theory*, Math. Inst. Techn. Univ. Delft Report, 1962.

Date: July, 8, 2023.

2020 Mathematics Subject Classification. 41A36; 41A25.

Key words and phrases. Kantorovich operators, Schurer operators, Stancu operators; L_p -convergence; Modulus of continuity.

- [14] O. Shisha, B. Bond, The degree of convergence of sequence of linear positive operators, Proc. Nat. Acad. Sci. USA., 60 (1968) 1196–1200
- [15] D.D. Stancu, Quadrature formulas constructed by using certain linear positive operators, Numerical Integration (Proc. Conf., Oberwolfach, 1982), LNM 57 (1982), 241–251, Birkhäuser Verlag, Basel.
- [16] D. D. Stancu, Approximation of functions by means of a new generalized Bernstein operator, Calcolo 20(2) (1983), 211–229.
- [17] R. Yang, J. Xiong, F. Cao, Multivariate Stancu operators defined on a simplex, Appl. Math. Comput. 138 (2003), 189–197.
- [18] A. Zygmund, Trigonometry; Series I, II. Cambridge University Press, Cambridge, UK., 1959.

ANKARA HACI BAYRAM VELI UNIVERSITY, POLATLI FACULTY OF SCIENCE AND LETTERS, DEPARTMENT OF MATHEMATICS, 06900, ANKARA, TÜRKIYE
Email address: nurseren.stin07@gmail.com

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 106-107

OPTIMIZATION OF GURNEY FLAP OVER NACA 0018 BY USING SURROGATE MODELING

EMRE GÜNER, MEHMET ERDEM, ŞİHMEHMET YILDIZ, AND MELIKE NIKBAY

0000-0001-7507-8638, 0000-0002-4455-8685, 0000-0001-5447-172X and 0000-0002-0857-2834

ABSTRACT

This research investigates the impact of the Gurney flap on the aerodynamic performance of the NACA 0018 airfoil at a Reynolds number of $Re = 1 \times 10^5$. A total of forty data sets are generated using the Halton sampling method, and computational fluid dynamics (CFD) simulations are performed on each set. The CFD outputs are then utilized to train a surrogate model based on the Kriging method. The optimization process employs the differential evolution algorithm to determine the optimal Gurney flap height, width and angle of attack values. The findings demonstrate that the optimized Gurney flap configuration leads to a significant enhancement in the lift coefficient, with an average increase of approximately 26.9%. These results underscore the effectiveness of the Gurney flap as a means to improve the aerodynamic performance of the NACA 0018 airfoil at the specified Reynolds number. Further investigations and experimental validations are recommended to validate the obtained results and explore potential applications in practical aerodynamic designs.

REFERENCES

- [1] H. Amini, Y. H., H. Emdad, and M. Farid, "Adjoint shape optimization of airfoils with attached Gurney flap", *Aerospace Science and Technology*, Vol. 41, pp. 216-228 (2015).
- [2] B. L. Storms, and C. S. Jang, "Lift enhancement of an airfoil using a Gurney flap and vortex generators", *Journal of Aircraft*, Vol. 31, No. 3, pp. 542-547 (1994).
- [3] C. S. Jang, J. C. Ross, and R. M. Cummings, "Numerical investigation of an airfoil with a Gurney flap", *Aircraft Design*, Vol. 1, No. 2, pp. 75-88 (1998).
- [4] K. Yee, W. Joo, and D. H. Lee, "Aerodynamic performance analysis of a Gurney flap for rotorcraft application", *Journal of Aircraft*, Vol. 44, No. 3, pp. 1003-1014 (2007).
- [5] Y. C. Li, J. J. Wang, and J. Hua, "Experimental investigations on the effects of divergent trailing edge and Gurney flaps on a supercritical airfoil", *Aerospace Science and Technology*, Vol. 11, No. 2-3, pp. 91-99 (2007).
- [6] M. K. Singh, K. Dhanalakshmi, and S. K. Chakraborty, "Navier-Stokes analysis of airfoils with Gurney flap", *Journal of Aircraft*, Vol. 44, No. 5, pp. 1487-1493 (2007).

Date: July, 8, 2023.

Key words and phrases. Aerodynamics, Flow Control, Gurney Flap, Optimization, Surrogate Model.

- [7] T. Yu, J. J. Wang, and P. F. Zhang, "Numerical simulation of Gurney flap on RAE-2822 supercritical airfoil", *Journal of Aircraft*, Vol. 48, No. 5, pp. 1566-1575 (2011).
- [8] L. Daniel, and L. W. Traub, "Effect of aspect ratio on gurney-flap performance", *Journal of Aircraft*, Vol. 50, No. 4, pp. 1217-1225 (2013).
- [9] M. Meena, K. Taira, and K. Asai, "Airfoil-wake modification with gurney flap at low Reynolds number", *AIAA Journal*, Vol. 56, No. 4, pp. 1348-1359 (2017).

(Emre Güler, Mehmet Erdem) TARSUS UNIVERSITY, AEROSPACE ENGINEERING, 33400, MERSIN, TURKEY

Email address: emreguler@arsus.edu.tr, mehmeterdem@arsus.edu.tr

ISTANBUL TECHNICAL UNIVERSITY, AERONAUTICAL AND ASTRONAUTICAL ENGINEERING, 34469, ISTANBUL, TURKEY

Email address: gurez@itu.edu.tr, erdem23@itu.edu.tr, yildizsih@itu.edu.tr, nikkbay@itu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 108

**APPROXIMATION BY BIVARIATE COMPLEX
SCHURER-STANCU POLYNOMIALS IN COMPACT DISKS**

NESIBE MANAV MUTLU

0000-0002-7853-6337

ABSTRACT

This study focuses on investigating the ability of the tensor product type bivariate complex Schurer-Stancu operators to approximate analytic functions on compact polydisks. The study derives the simultaneous approximation order and Voronovskaja-type outcomes for these polynomials using a qualitative estimate. The results provide insights into the accuracy of these polynomials in approximating analytic functions and their associated compact polydisks.

REFERENCES

- [1] N. Çetin, *A new complex generalized Bernstein-Schurer operator*. Carpathian Journal of Mathematics, (2021), 37, 1, 81-89.
- [2] S.G. Gal, *Approximation by Complex Bernstein and Convolution Type Operators*. World Scientific, (2009).
- [3] D. D. Stancu, *Quadrature formulas constructed by using certain linear positive operators*, Numerical Integration (Proc. Conf., Oberwolfach, 1981), ISNM 57 (1982) 241–251, Birkhauser Verlag, Basel Approx. 37, (2008) 47-52.

DEPARTMENT OF MANAGEMENT INFORMATION SYSTEMS, İSTANBUL NİŞANTAŞI UNIVERSITY, 34398, İSTANBUL, TURKEY

Email address: nesibe.manavm@gmail.com

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 47A58, 30E10; 41A25.

Key words and phrases. Schurer-Stancu operators, Bivariate complex operators, Rate of convergence, Exact order.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 109

APPROXIMATION BY GENERALIZATION OF BERNSTEIN-SCHURER OPERATORS

NURSEL ÇETİN AND NESİBE MANAV MUTLU

0000-0003-3771-6523 and 0000-0002-7853-6337

ABSTRACT

In this study, we investigate some approximation properties of a new generalization of Bernstein-Schurer operators. Firstly, we give a uniform approximation result and the rate of convergence by means of modulus of continuity. Then, we obtain Voronovskaja and Grüss-Voronovskaja results. Finally, we demonstrate some numerical examples relevant to our results.

REFERENCES

- [1] D.D. Stancu, *Quadrature formulas constructed by using certain linear positive operators*, Numerical Integration (Proc. Conf., Oberwolfach, 1981), ISNM 57, pp. 241–251 (1982).
- [2] S.G. Gal and H. Gonska, *Grüss and Grüss-Voronovskaya-type estimates for some Bernstein-type polynomials of real and complex variables*, Jaen J. Approx. 7 (1), 97–122, (2015).
- [3] D. Barbosu, *Schurer-Stancu type operators*, Studia Univ. Babeş-Bolyai Math., 48, No 3, (2003).
- [4] F. Schurer, *Linear positive operators in approximation theory*, Math. Inst. Techn. Univ. Delft Report, (1962).

(Nursel Çetin) DEPARTMENT OF MATHEMATICS, ANKARA HACI BAYRAM VELİ UNIVERSITY,
06900, ANKARA, TÜRKİYE

Email address: nurselcetin07@gmail.com

(Nesibe Manav Mutlu) DEPARTMENT OF MANAGEMENT INFORMATION SYSTEMS, İSTANBUL NİŞANTAŞI
UNIVERSITY, 34398, İSTANBUL, TÜRKİYE

Email address: nesibe.manavm@gmail.com

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 41A36; 41A25.

Key words and phrases. Stancu operators, Schurer operators, Moduli of continuity, Rate of convergence, Voronovskaya type theorem, Grüss-Voronovskaya type theorem.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSIN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 110

PRECONDITIONING LINEAR SYSTEMS USING KRONECKER SUM DECOMPOSITION

Y. MEZZAR

0000-0003-4702-1346

ABSTRACT

In this study, we proposed a new matrix decomposition (Kronecker sum decomposition KSD) and applied it to create a new technique to preconditioning linear systems based on Incomplete Cholesky decomposition and we found an improvement in convergence acceleration of iterative methods.

REFERENCES

- [1] V. Vorst, H.A., Bi-CGSTAB : A Fast and Smoothly Converging Variant of Bi-CG for the Solution of Nonsymmetric Linear Systems, SIAM, J. Sci. Statist. Comput., 13, pp. 631-644, (1992).
- [2] T. Lyche, Numerical Linear Algebra and Matrix Factorizations, Texts in Computational Science and Engineering, Springer (2020).

UNIVERSITY ORAN1, LABORATORY OF MATHEMATICS AND ITS APPLICATIONS (LAMAP), P.O. BOX 1524, ORAN 31000, ALGERIA.
Email address: youcefmezzar@gmail.com

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 15A69, 65F08, 65F10, 65Y04.

Key words and phrases. Kronecker sum decomposition, Preconditioner, Incomplete Cholesky factorization.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 111

SOME NUMERICAL APPROACHES FOR COMPUTING THE HANKEL TRANSFORM

M. GÜNEY AND Z. USTAAGLU

0000-0003-2368-329X and 0000-0001-7941-2507

ABSTRACT

In this study some approaches have been investigated for the numerical computation of the Hankel transform and Bessel functions. The Hankel transform [1] of a function $f(r)$, $0 < r < \infty$, is defined as

$$H_v\{f(r); s\} = \int_0^{\infty} f(r)rJ_v(rs)dr$$

where J_v is the Bessel's function of the first kind of order v [2] and $rJ_v(rs)$ is the kernel of the Hankel transform. The Hankel transform arises in solving numerous boundary-value problems in a relatively straightforward way, using various properties of Bessel functions. The aim in these applications is to transfer the problem to a solvable space, solve the problem it in that space, and then return to the original space using the inverse transform. As applications, we presented approximate solutions of two boundary value problems [3].

REFERENCES

- [1] I. N. Sneddon, Fourier Transforms, Dover, New York, (1951).
- [2] B. G. Korenev, Bessel Functions and Their Applications, Taylor and Francis, London (2002).
- [3] R. Piessens, The Hankel Transform, The Transforms and Applications Handbook: Second Edition. Ed. Alexander D. Poularikas, CRC Press LLC, Boca Raton (2010).

ZONGULDAK BÜLENT ECEVİT UNIVERSITY, DEPARTMENT OF MATHEMATICS, 67100, ZONGULDAK, TÜRKİYE

Email address: mrym.kdrt123@gmail.com

ZONGULDAK BÜLENT ECEVİT UNIVERSITY, DEPARTMENT OF MATHEMATICS, 67100, ZONGULDAK, TÜRKİYE

Email address: zekeriyaustaoglu@beun.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 44A15; 33C10.

Key words and phrases. Hankel transform, Bessel function.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 112-113

FROM SIMPLICIAL HOMOTOPY TO CROSSED MODULE HOMOTOPY

H. GÜLSÜN AKAY

0000-0001-7983-6852

ABSTRACT

Simplicial commutative algebras are involved in homological algebra, homotopy theory, algebraic K-theory and algebraic geometry. Arvasi and Porter have recently worked on the n -types of simplicial algebras in [8, 9]. Also Akça and Z.Arvasi [2], examined higher order Peiffer elements in simplicial Lie algebras.

Group crossed modules were firstly introduced by Whitehead in [3, 4]. The homotopy relation between crossed module maps $: G \rightarrow G'$ was introduced by Whitehead in [4], in the context of “homotopy systems”, now called free crossed complexes. In [6] (see also [7]), homotopy was investigated in terms of a monoidal closed structure on crossed complexes, and an interval object. Homotopy for crossed complexes was also developed in [5].

In [1], we show clearly that, the homotopy relation for free simplicial algebras morphisms $\mathbf{X} \rightarrow \mathbf{X}'$ is an equivalence relation. And then, we prove that this notion of homotopy yields a groupoid with objects being the simplicial algebra morphisms between two fixed 1-truncated simplicial algebras (with free domain), and the morphisms being the homotopies between 1-truncated simplicial algebra morphisms.

In this work, we obtain a homotopy of crossed module maps from homotopy of simplicial maps and we obtain a homotopy of simplicial maps from homotopy of crossed module maps.

REFERENCES

- [1] H. Gülsün Akay, Groupoid Structure on Homotopies of Simplicial Maps, 2nd International E-Conference on Mathematical and Statistical Science: A Selcuk Meeting, Konya, Turkey (2023).
- [2] İ. Akça and Z. Arvasi, Simplicial and crossed Lie algebras, Homology, Homotopy and Applications, Vol.4, N.1, pp.43-57, (2002).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 55U10; 18D40, 55Q05.

Key words and phrases. Simplicial algebra, Homotopy, Groupoid.

- [3] J.H.C. Whitehead, On adding relations to homotopy groups, Ann. of Math.(2), Vol.42, pp.409-428 (1941).
- [4] J.H.C. Whitehead, Note on a previous paper entitled "On adding relations to homotopy groups", Ann. of Math.(2), Vol.47, pp.806-813 (1946).
- [5] J. Huebschmann, Crossed n -folds extensions of groups and cohomology, Commentarii Mathematici Helvetici, Vol.55, pp.302-313, (1982).
- [6] R. Brown and P.J. Higgins, Tensor products and homotopies for ω -groupoids and crossed complexes, J. Pure Appl. Algebra, Vol. 47, pp.1-33, (1987).
- [7] R. Brown, P.J. Higgins, and P. Sivera, Non-abelian algebraic topology: Filtered spaces, crossed complexes, cubical homotopy groupoids, European Mathematical Society (EMS), (2011).
- [8] Z. Arvasi and T.Porter, Simplicial and crossed resolutions of commutative algebras, Journal of Algebra, Vol.181, pp. 26-48, (1996).
- [9] Z. Arvasi and T.Porter, Higher order Peiffer elements in simplicial commutative algebras, Theory and Applications of Categories, Vol.3, N.1, pp.1-23, (1997).

ESKIŞEHİR OSMAN GAZİ UNIVERSITY, MATHEMATICS AND COMPUTER SCIENCE DEPARTMENT,
26040, ESKIŞEHİR, TURKEY
Email address: hg_1sun@ogu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 114

A GENERALIZATION OF THE LINEAR POSITIVE OPERATORS BY USING THE SPECIAL POLYNOMIALS

KADIR KANAT, MELEK SOFYALIOĞLU, AND VERDA KARADAŞ

0000-0002-7738-903X, 0000-0001-7837-2785 and 0009-0005-5348-180X

ABSTRACT

In this talk, we introduce a new generalization of Szász operators with the help of special polynomials. Firstly, we examine the convergence rate of our new operator and then we find some approximation results. We also investigate new relationships using Gould-Hopper and Hermite polynomials respectively, which are more specific examples. Finally, a Voronovskaya-type theorem is given.

REFERENCES

- [1] Sofyaloğlu Melek and Kanat Kadir, Approximation by Szász-Baskakov operators based on Boas-Buck-type polynomials, Approximation by Szász-Baskakov operators based on Boas-Buck-type polynomials, 36, 11, 3655–3673 (2022).
- [2] Varma Serhan and Sucu Sezgin, A generalization of Szász operators by using the Appell polynomials of class $A^{(2)}$, Symmetry, 14, 7, 1410, (2022).
- [3] Jakimovski A and Leviatan D, Generalized Szász operators for the approximation in Mathematica (Cluj), 11, 34, 97–103 (1969).
- [4] Gavrea I and Raşa I, Remarks on some quantitative Korovkin-type results, Revue d'analyse numérique et de théorie de l'approximation, 22, 2, 173–176, (1993).

(Kadir KANAT) ANKARA HACI BAYRAM VELI UNIVERSITY, MATHEMATICS DEPARTMENT, ANAKRA, TURKEY

Email address, Kadir KANAT: kadir.kanat@hbv.edu.tr

(Melek SOFYALIOĞLU) ANKARA HACI BAYRAM VELI UNIVERSITY, MATHEMATICS DEPARTMENT, ANAKRA, TURKEY

Email address, Melek Sofyaloğlu: melek.sofyalioglu@hbv.edu.tr

(Verda KARADAŞ) ANKARA HACI BAYRAM VELI UNIVERSITY, MATHEMATICS DEPARTMENT, ANAKRA, TURKEY

Email address, Verda KARADAŞ: verda.karadas@hbv.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 41A25, 41A36; 47A58.

Key words and phrases. Szász operators, Gould-Hopper polynomials, Hermite polynomials.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 115-116

COMPUTATIONAL AEROACOUSTIC MODELING OF SUPERSONIC CAVITY FLOWS USING OPEN-SOURCE FLOW SOLVERS

R.KABA, M. NİKBAY, AND B. ZAFER

ABSTRACT

Cavity flow is a fluid mechanics problem that engineers from many different disciplines may encounter. Today, many problems such as aircraft landing gear, weapon and store bays, windshield gaps and sunroofs of vehicles can be defined with this flow.

Although a cavity has a simple geometry, it has very complex flow physics. This complexity creates high-order drag resistance, energy loss, acoustic vibration and noise for the system or component in which it is located. In addition, it negatively affects the radar visibility, which has been intensively studied in the military industries in recent years. Reducing the radar cross section is often given great importance in the design of modern fighter aircraft. On the other hand transonic and supersonic flight continuity have become essential in new generation military aircrafts. A particular consequence of such requirements is the embedded weapon bay in the aircraft configuration.

In this study, computational aeroacoustic modeling of supersonic cavity flows is investigated by using open source solvers and validated with the main test studies in the literature. Referenced test problem M219 cavity is examined in detail and with many inputs, assumptions and methods will be determined for the numerical analysis to be made. OpenFOAM with HISA was used for simulations.

With this study, the high-accuracy simulations required for the optimization study were performed by using IDDES (Improved Delayed DES) coupling k-w SST. Simulations were compared with reference studies (test and numerical [1]) in terms of SPL and OASPL values. Extensive knowledge has been acquired about the FFT transformation method, which allows switching from the time domain to the frequency domain for pressure data. The analysis were run until the flow time of 0.17 seconds.

This case is a challenge for CFD due to its unsteady nature and high frequency content. The acoustic character of the cavity is analyzed in detail. Rossiter modes

Date: July, 8, 2023.

Key words and phrases. Cavity flow, Aeroacoustic modeling.

trends all succeeded within an agreeable range. It has been observed that the mesh model captures acoustic noise generation better and the aft wall of the cavity plays the most important role in terms of acoustics as given in the wind tunnel test study.

Future work will focus on the implementation of the developed aeroacoustic modeling strategies into a multidisciplinary design optimization framework efficiently to improve the aeroacoustic performance of cavity flows.

REFERENCES

- [1] S.J. Lawson, G.N. Barakos, A. Simpson, Understanding cavity flows using proper orthogonal decomposition and signal processing, *Journal of Algorithms and Computational Technology*, Vol.4,N.01, (2009). DOI number: 10.1260/1748-3018.4.1.47
- [2] D. Nightingale, J. Piggott, G. Foster, Cavity Unsteady pressure measurements-Examples from Wind-Tunnel Tests, Tech. Rep. Version 3, Aerodynamics & Aeromechanics Systems Group, QinetiQ (2005)
- [3] S.J. Lawson, G.N. Barakos, Computational Fluid Dynamics Analyses of Flow over Weapons-Bay Geometries, *Journal of Aircraft*, Vol.47,N.05, (2010). DOI number: 10.2514/1.C000218
- [4] S.J. Lawson, G.N. Barakos, Review of numerical simulations for high-speed, turbulent cavity flows, *Progress in Aerospace Sciences*, Vol.47,N.03, (2011). DOI number: 10.1016/j.paerosci.2010.11.002
- [5] H. Heller, D. Holmes, E. Covert, Flow Induced Pressure Oscillations in Shallow Cavities, *Journal of Sound and Vibration*, Vol.18,N.04, (1971).

(author one) İSTANBUL TECHNICAL UNIVERSITY, FACULTY OF AERONAUTICS AND ASTRONAUTICS, 34469, İSTANBUL, TÜRKİYE

Email address, author one: ramazankaba99@gmail.com.tr

(author two) İSTANBUL TECHNICAL UNIVERSITY, FACULTY OF AERONAUTICS AND ASTRONAUTICS, 34469, İSTANBUL, TÜRKİYE

Email address, author two: nikbay@itu.edu.tr

(author three) İSTANBUL TECHNICAL UNIVERSITY, FACULTY OF AERONAUTICS AND ASTRONAUTICS, 34469, İSTANBUL, TÜRKİYE

Email address, author three: zaferba@itu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 117

ON A ONE TYPE FRACTIONAL STURM-LIOUVILLE PROBLEM

P.TÜRKMEN

0009-0003-7348-8182

ABSTRACT

The concept of fractional order derivatives has been studied for a long time. The reason for this is that integer order derivatives are thought to be insufficient to explain physical events, will be better expressed with a fractional order derivative, and will give better results. The most commonly used fractional calculus types are Riemann-Liouville's and Caputo's fractional derivatives and integrals. In this study, first the approaches and solution proposals in these fields are emphasized, and then a one type Sturm-Liouville boundary value problem is studied. Especially, some important theorems in classical Sturm-Liouville theory are examined for the fractional case.

REFERENCES

- [1] A.A. Kilbas, H.M. Srivastava, J.J Trujillo, Theory and Applications of Fractional Differential Equations, Elsevier, Amsterdam, (2006).
- [2] E.A. Coddington, R. Carlson, Linear ordinary differential equations, Siam, Philadelphia, (1997).
- [3] I. Podlubny, Fractional Differential Equations, Academic Press, San Diego, (1999).
- [4] K.S. Miller, B. Ross, An Introduction to the Fractional Calculus and Fractional Differential Equations, Wiley and Sons, New York, (1993).
- [5] M. Klimek, On solutions of linear fractional differential equations of a variational type, Layout, Czestochowa, (2009).
- [6] M. Rivero, J.J. Trujillo and M.P. Velasco, A Fractional Approach to the Sturm-Liouville Problem, Central European Journal of Physics, 11(10), 1246-1254 (2013). DOI 10.2478/s11534-013-0216-2.
- [7] R.V. Churchill, J.W. Brown, Fourier series and boundary value problems, McGraw-Hill, New York, (1993).
- [8] W.E. Boyce, R.C. DiPrima, Elementary differential equations and boundary value problems, John Wiley and Sons, USA, (2005).

GAZIANTEP UNIVERSITY, MATHEMATICS OF DEPARTMENT, 27470, GAZIANTEP, TURKEY
Email address: pinarturkmen049@gmail.com

Date: July, 8, 2023.

Key words and phrases. Fractional operators, Fractional spatial derivatives, Sturm-Liouville theory.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 118-119

ALMOST SUPRA β -CONTINUOUS FUNCTIONS

T. M. TALAS AND AYNUR KESKIN KAYMAKCI

ABSTRACT

In this paper we investigate the notion of λ strong β -I-open sets which are complement of λ strong β -I-closed sets. Then, defining types of contra continuity for λ strong β -I-closed sets we will give properties and characterizations of them. Finally, two low separation axioms, namely strong β -I-TThe important properties of it that is stronger than both almost supra pre-continuity and almost supra semi-continuity and weaker than almost supra β -continuity.

REFERENCES

- [1] T.M Al-shami, Supra results related to supra topological spaces, Journal of Advanced Studies in Topology, 7(4), 283-294, (2016).
- [2] T.M.Al-Shami, On supra semi open sets and some applications on topological spaces, Journal of Advanced Studies in Topology, 8(2), 144-153, (2017).
- [3] R.Devi, S.Sampathkumar and M.Caldas, On supra α -open sets and $S\alpha$ -continuous functions, General Mathematics, 16(2), 77-84, (2008).
- [4] M. E. El-Shafei, A. H. Zakari and T.M.Al-Shami, Some applications of supra preopen sets, Hindawi Journal of Mathematics, Volume 2020, Article ID 9634206, <https://doi.org/10.1155/2020/9634206>.
- [5] S. Jafari and S. Tahiliani, Supra β -open sets and supra β -continuity on topological spaces, Annales Univ. Sci. Budapest., 56, 1-9, (2013).
- [6] A. Keskin and T. Noiri, Almost b-continuous functions, Chaos, Solitons and Fractals, 41(1), 72-81, (2009).
- [7] A. S. Mashhour, A. A. Allam, F. S. Mahmoud and F. H. Khedr, On supra topological spaces, Indian J. Pure Appl. Math., 14(4), 502-510, (1983).
- [8] O.R.Sayed, Supra pre-open sets and supra pre-continuity on topological spaces, Series Mathematics and Information, 20, 79-88,(2010).
- [9] O. R. Sayed and T. Noiri, On supra b-open sets and supra b-continuity on topological spaces, European Journal of Pure and Applied Mathematics, 3(2), 295-302, (2010).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 54A10; 54A20.

Key words and phrases. Supra b-open set, almost supra b-continuity.

(author one) SELCUK UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF MATHEMATICS, CAMPUS, 42031, KONYA/TÜRKİYE

Email address, author one: canfatma8485@gmail.com

(author two) SELCUK UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF MATHEMATICS, CAMPUS, 42031, KONYA/TÜRKİYE

Email address, author two: akeskir@selcuk.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 120-121

**USING FUZZY LOGIC IN MARKET CONDITIONS FOR
EFFICIENT PORTFOLIO SELECTION IN THE CASABLANCA
STOCK EXCHANGE**

A. HAMIDI ALAOUI

ABSTRACT

Does history repeat itself? Yes it does; but not the exact same way. Market conditions dictate on investors and traders how they invest their money. But since humans learn and adapt, they may not repeat the same decisions they have taken in previously observed market conditions. Consider a market composed of N stocks, S_1, \dots, S_N , with market capitalizations C_1, \dots, C_N . Let Ω be a set of uniquely designed texts, Σ a set of market conditions, Ψ_1 a mapping from \mathbb{R} to Σ , Ψ_2 a mapping from Σ to Ω , $\Psi = \Psi_2 \circ \Psi_1$, and Φ is a fuzzy-matching algorithm from Ω to Ω^d . At time t_0 , let τ_0 be the mapping of all market capitalizations using Ψ , $\tau_{-1}, \tau_{-2}, \tau_{-3}, \dots$ be the mappings of all markets capitalizations that occurred before t_0 , and $\Phi_0 = [\Phi(\tau_0)]_i$ be the best match using an extra one-day lag match. Φ_0 occurred at time t_{-k} . We look for the efficient portfolio at time t_{-k+1} and build a similar portfolio at time t_0 . This method shows that, almost 73% of the time, the portfolio we obtain is among the 1000 most efficient portfolios in the 20000 simulated portfolios for daily data between January 01, 2009 and December 31, 2019. Computationally, we can conclude that matching overall market conditions, not necessarily individual stock conditions, can give better investment decisions in the Casablanca Stock Exchange.

REFERENCES

- [1] Kalyanathaya et.al, A Fuzzy Approach to Approximate String Matching for Text Retrieval in NLP, Journal of Computational Information Systems, Vol.15, N.3, 26-32 (2019).
- [2] Navarro, G., A Guided Tour to Approximate String Matching, ACM Computing Surveys, Vol.33, pp.36-38 (2000). 10.1145/375360.375365
- [3] Grinblatt M., Keloharju M., The investment behavior and performance of various investor types: a study of Finland's unique data set, Journal of Financial Economics, Vol.55, N.1, pp.43-67 (2000). 10.1016/S0304-405X(99)00044-6
- [4] H. Markowitz, Portfolio selection, The Journal of Finance, Vol.7,N.1, pp.77-91 (1952). 10.2307/2975974

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 03B52; 90C70.

Key words and phrases. Fuzzy logic, Data mining, Efficient portfolio, MENA.

USING FUZZY-LOGIC IN MARKET CONDITIONS FOR EFFICIENT PORTFOLIO SELECTION

AL AKHAWAYN UNIVERSITY, SCHOOL OF BUSINESS ADMINISTRATION, 53000, IFRANE, MOROCCO
Email address, author one: a.hamidialaoui@uai.ma

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 122

**THE SELFADJOINT SCHRÖDINGER OPERATOR ON THE
HALF LINE WITH A REAL-VALUED COMPACTLY
SUPPORTED POTENTIAL**

MEHMET ÜNLÜ

0000-0001-6793-253X

ABSTRACT

For the selfadjoint Schrödinger operator on the half line with a real-valued compactly supported potential, it is shown that the boundary condition at the origin and the potential are uniquely determined by the continuous part of the Gel'fand-Levitan spectral data alone. It is also shown that the boundary condition and the potential are uniquely determined by the continuous part of the Marchenko scattering data alone.

REFERENCES

- [1] T. Aktosun, Bound states and inverse scattering for the Schrödinger equation in one dimension, *J. Math. Phys.* 35, 6231–6236 (1994).
- [2] T. Aktosun. Inverse Schrödinger scattering on the line with partial knowledge of the potential, *SIAM J. Appl. Math.* 56, 219–231 (1996).
- [3] T. Aktosun, Factorization and small-energy asymptotics for the radial Schrödinger equation, *J. Math. Phys.* 41, 4262–4270 (2000).
- [4] T. Aktosun and R. Weder, Inverse spectral-scattering problem with two sets of discrete spectra for the radial Schrödinger equation, *Inverse Problems* 22, 89–114 (2006).
- [5] T. Aktosun, P. Sacks, and M. Unlu, Inverse problems for selfadjoint Schrödinger operators on the half line with compactly supported potentials *J. Math. Phys.* 56, 022106, (2015).
- [6] K. Chadan and P. C. Sabatier, *Inverse problems in quantum scattering theory*, 2nd ed., Springer, New York, (1989).

RECEP TAYYIP ERDOGAN UNIVERSITY, DEPARTMENT OF MATHEMATICS, 53100 RIZE, TURKEY
Email address: mehmet.unlu@erdogan.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 34A55 34L25 34L40 47A40.

Key words and phrases. Schrödinger equation on the half line, Selfadjoint boundary condition, Compactly supported potential, Scattering matrix, Jost function.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 123

**ON AN EIGENVALUE PROBLEM OF THE FRACTIONAL
STURM-LIOUVILLE BOUNDARY VALUE PROBLEMS**

Z.GEÇİT

0009-0003-0337-5916

ABSTRACT

In this presentation, we consider fractional Sturm-Liouville problems. We calculated the eigenvalues and eigenfunctions by means of decomposition method. Firstly, we refer to some definitions and theorems of the fractional Sturm-Liouville problems. Finally, we explained our approach with an example.

REFERENCES

- [1] I. Poblubny, Fractional Differential Equations, Academic Press, San Diego, (1999).
- [2] M. Rivero, J.J. Trujillo and M.P. Velasco, A Fractional Approach to the Sturm-Liouville Problem, Central European Journal of Physics, 11(10), 1246-1254 (2013).
DOI 10.2478/s11534-013-0216-2
- [3] Q.M. Al-Mdallal , On the Numerical Solution of Fractional Sturm–Liouville Problems, International Journal of Computer Mathematics, 87:12, 2837-2845 (2010).
DOI 10.1080/00207160802562549

GAZIANTEP UNIVERSITY, MATHEMATICS DEPARTMENT, 27470, GAZIANTEP, TURKEY
Email address: zeynepgecit02@gmail.com

Date: July, 8, 2023.

Key words and phrases. Fractional Sturm-Liouville, Eigenvalue, Eigenfunction.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 124-125

COMPOSITIONS OF PERMUTING n -DERIVATIONS WITH COMMUTATIVITY FOR ASSOCIATIVE RINGS

MEHSIN JABEL ATTEYA

ABSTRACT

The main purpose of this paper is to introduce the compositions of the permuting n -derivations Δ of R . This formula represents the keystone of investigating results concerning commutativity and centralizer permuting n -derivations for prime and semiprime rings. We establish theorems for centralizer mappings (resp. commuting mappings) and weakly semiprime ideal of a semiprime ring R .

REFERENCES

- [1] G. Maksa, A remark on symmetric biadditive functions having non-negative diagonalization, Glasnik. Mat. 15(35), 279-282, (1980).
- [2] M. Brešar, Commuting maps: a survey, Taiwanese J. Math. 8, 361-397, (2004).
- [3] M. Brešar, Martindale W.S. III, Miers C.R., Centralizing maps in prime rings with involution, J. Algebra 161, 342-357, (1993).
- [4] Ajda Fošner and Mehsin Jabel Atteya, Study of (σ, τ) -generalized derivations with their composition of semiprime rings, Kragujevac Journal of Mathematics, Vol. 43(4), Pages 535-558, (2019).
- [5] M. Ashraf, On symmetric bi-derivations in rings, Rend. Istit. Math. Univ. Trieste. 31(1-2), 25-36, (1999).
- [6] Hasret Yazali, Permuting triderivations of prime and semiprime rings, Miskolc Mathematical Notes, Vol. 18, No. 1, pp. 489-497, DOI: 10.18514/MMN.2017.1647, (2017).
- [7] Mehsin Jabel Atteya, Permuting 3-derivations of semiprime rings, In Proceedings of the 7th Annual Canadian Young Researchers Conference in Mathematics and Statistics, (2010). <http://www.math.ualberta.ca/~game/CYRC10/talks/MehsinAtteya.pdf>.
- [8] M.A. Öztürk, Permuting tri-derivations in prime and semiprime rings, East Asian Math. J., 15(2), 177-190, (1999).
- [9] Ajda Fošner, Prime and semiprime rings with symmetric skew 3-derivations, Aequationes mathematicae, Vol. 87, issue 1-2, March, pp 191-200. DOI <https://doi.org/10.1007/s00010-013-0208-8>, (2014).
- [10] Ajda Fošner, Prime and semiprime rings with symmetric skew n -derivations, Colloq. Math. 134(2), 245-253, (2014).
- [11] Y.S. Jung and K.H. Park, On prime and semi-prime rings with permuting 3-derivations, Bull. Korean Math. Soc. 44, 789-794, (2007).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 16W10, 16N60, 16W25.

Key words and phrases. n -derivation, Semiprime ring, Permuting mapping, Centralizer mapping.

- [12] M. Ashraf, N. Parveen and M.R. Jamal, Traces of permuting n -derivations and commutativity of rings, *Southeast Asian Bull. Math.* 38, 321-322, (2014).
- [13] Mohammad Ashraf and Nazia Parveen, On generalized (α, β) - n -derivations in rings, *Southeast Asian Bulletin of Mathematics*, 40, 774-796, (2016).
- [14] Asma Ali, Mehsin Jabel Atteya, Phool Miya and Farhat Ali, Semigroup ideals and permuting 3-generalized derivations in prime near-rings, *Italian Journal of Pure and Applied Mathematics*, n.35, 207-226, (2015).
- [15] Xiaowei Xu, Yang Liu and Wei Zhang, Skew N -derivations on semiprime rings, *Bull. Korean Math. Soc.* 50, No. 6, pp. 1863-1871, <http://dx.doi.org/10.4134/BKMS.2013.50.6.1863>, (2013).
- [16] D. Eremita, Functional identities of degree 2 in triangular rings, *Linear Algebra Appl.* 438, 584-597, (2013).
- [17] Mohammad Ashraf and Mohammad Aslam Siddeeqe, On (σ, τ) - n -derivations in near-rings, *Asian-European Journal of Mathematics*, Vol.06, No. 04, 1350051, <http://dx.doi.org/10.1142/S1793557113500514>(14 pages), (2013).
- [18] Emine Koç and Mustafa Mur Rehman, Notes on symmetric skew n -derivation in rings, *Commun. Korean Math. Soc.*33, No. 4, pp. 1113- 1121, <https://doi.org/10.4134/CKMS.c170454>, (2019).
- [19] Yao Wang, Yi Wang and Yiqiu Du, n -derivations of triangular algebras, *Linear Algebra and its Applications*,439, 463-471, (2013).
- [20] D. Eremita, Functional identities of degree 2 in triangular rings, *Linear Algebra Appl.* 438, 584-597, (2013).
- [21] V. G. Skosyrskii, Strongly prime noncommutative Jordan algebras, *Trudy Inst. Mat.(Novosibirsk)*16, 131-164 (in Russian), (1989).
- [22] A. M. Ibrahim, Extension of factorial concept to negative numbers, *Notes on Number Theory and Discrete Mathematics*, Vol.19, No.2, 30-42, (2013).
- [23] I. N. Herstein, A commutativity theorem, *J. Algebra* 38(1), 112-118, (1976).
- [24] H. E Bell and W. S Matindale III, Centralizing mappings of semiprime rings, *Canad. Math. Bull.*, 30(1), 42-60, (1987).
- [25] P.M.Cohn, *Further algebra and applications*, Springer-Verlag London Berlin Heidelberg, 1st edition, SBN 978-1-4471-1120-7, (2003).
- [26] K.H. Park, On prime and semiprime rings with symmetric n -derivations, *Journal of Chungcheong Mathematical Society* 22, 451-458,(2009).

DEPARTMENT OF MATHEMATICS, COLLEGE OF EDUCATION, AL-MUSTANSIRIYAH UNIVERSITY, IRAQ.

Email address: mehsinatteya88@uomustansiriyah.edu.iq

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 126

**POSITIVE TOEPLITZ OPERATORS BETWEEN
HARMONIC BLOCH SPACES ON THE BALL**

ÖMER FARUK DOĞAN

0000-0002-0168-1456

ABSTRACT

The theory of Toeplitz operators on harmonic or holomorphic Bergman spaces on the unit ball is a well established subject. In this study, we define generalized Toeplitz operators between weighted harmonic Bloch spaces b_α^∞ on the unit ball of \mathbb{R}^n ($n \geq 2$) for the full range of parameter $\alpha \in \mathbb{R}$. We give characterizations of bounded and compact Toeplitz operators taking one weighted harmonic Bloch space into another in terms of certain Carleson and vanishing Carleson measures. Our results extend those known for standart harmonic Bloch spaces.

REFERENCES

- [1] D. Alpay and H. T. Kaptanoğlu, Toeplitz operators on Arveson and Dirichlet spaces, Integr. Equ. Oper. Theory, 58, 1–33 (2007).
<https://doi.org/10.1007/s00020-007-1493-1>
- [2] S. Axler, P. Bourdon, and W. Ramey, Harmonic function theory, 2nd ed., Grad. Texts in Math., vol. 137, Springer, New York (2001).
- [3] Ö. F. Doğan, Positive Toeplitz operators from a harmonic Bergman–Besov space into another, Banach J. Math. Anal. 16, 70 (2022).
<https://doi.org/10.1007/s43037-022-00224-3>
- [4] Ö. F. Doğan and A. E. Üreyen, Weighted harmonic Bloch spaces on the ball. Complex Anal. Oper. Theory, 12(5), 1143–1177 (2018).
<https://doi.org/10.1007/s11785-017-0645-9>
- [5] J. Pau and R. Zhao, Carleson measures and Toeplitz operators for weighted Bergman spaces of the unit ball, Michigan Math. J., 64, 759–796 (2015).
DOI: 10.1307/mmj/1447878031

TEKİRDAĞ NAMIK KEMAL UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF MATHEMATICS,
TEKİRDAĞ, TÜRKİYE
Email address: ofdogan@nku.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 47B35, 31B05.

Key words and phrases. Toeplitz operator, Bergman-Besov kernel, Harmonic Bloch Space, Carleson measure.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 127

**ON SOME NATURAL GEOMETRIC DIFFERENTIAL
OPERATORS**

RĂZVAN M. TUDORAN

0000-0002-9399-2920

ABSTRACT

The aim of this talk is to present a method to extend to manifolds endowed with a general geometric structure, the classical gradient and Laplace operators, and also to analyze some of their natural properties.

REFERENCES

- [1] R.M. Tudoran, On invariant properties of natural differential operators associated to geometric structures on \mathbb{R}^n , Journal of Mathematical Analysis and Applications, Vol. 518, N. 2, 126790, pp. 1-12 (2023).
<https://doi.org/10.1016/j.jmaa.2022.126790>
- [2] R.M. Tudoran, On differential operators generated by geometric structures, arXiv: 2302.00983, pp. 1-30 (2023).

WEST UNIVERSITY OF TIMIȘOARA, FACULTY OF MATHEMATICS AND COMPUTER SCIENCE, DEPARTMENT OF MATHEMATICS, 300223, TIMIȘOARA, ROMANIA
Email address: razvan.tudoran@e-uvt.ro

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 58C06; 58J06, 58C35.

Key words and phrases. Geometric structures, Gradient-like vector fields, Invariant functions, Laplace-like operators.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 128-129

GENERALIZED SYMMETRIC BI-DERIVATIONS OF UP-(BCC)-ALGEBRAS

DAMLA YILMAZ

0000-0002-6741-8669

ABSTRACT

In this paper, we define the notions of generalized (l, r) -symmetric bi-derivations and generalized (r, l) -symmetric bi-derivations on UP-algebras. We also explore some of the properties these derivations.

REFERENCES

- [1] H. A. Abujabal, N. O. Al-Shehri, Some results on derivations of BCI-algebras, Journal of natural sciences and mathematics-Lahore, 46(1/2), 13 (2006).
- [2] H. A. Abujabal, N. O. Al-Shehri, On left derivations of BCI-algebras, Soochow Journal of Mathematics, 33(3), 435 (2007).
- [3] A. M. Al-Roqi, On generalized (α, β) -derivations in BCI-algebras, Journal of applied mathematics and informatics, 32(1,2), 27-38 (2014).
- [4] L. K. Ardekani, B. Davvaz, On generalized derivations of BCI-algebras and their properties, Journal of Mathematics, 2014 (2014).
- [5] S. M. Bawazeer, N. O. Alshehri, R. S. Babusail, Generalized derivations of BCC-algebras, International Journal of Mathematics and Mathematical Sciences, 2013 (2013).
- [6] Q. P. Hu, On some classes of BCI-algebras, Math. Japon., 29, 251-253 (1984).
- [7] A. Iampan, A new branch of the logical algebra: UP-algebras, Journal of Algebra and Related Topics, 5(1), 35-54 (2017).
- [8] A. Iampan, Derivations of UP-algebras by means of UP-endomorphisms, Algebraic Structures and Their Applications, 3(2), 1-20 (2016).
- [9] S. Ilbira, A. Firat, Y. B. Jun, On symmetric bi-derivations of BCI-algebras, Applied Mathematical Sciences, 5(57-60), 2957-2966 (2011).
- [10] Y. Imai, K. Iséki, On axiom systems of propositional calculi, I. Proceedings of the Japan Academy, 41(6), 436-439 (1965).
- [11] K. Iséki, An algebra related with a propositional calculus, Proceedings of the Japan Academy, 42(1), 26-29 (1966).
- [12] Y. B. Jun, X. L. Xin, On derivations of BCI-algebras, Information Sciences, 159(3-4), 167-176 (2004).
- [13] Gy. Maksa, A remark on symmetric bi-additive functions having nonnegative diagonalization, Glasnik Math, 15(35), 279-282 (1980).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 03G25 13N15; 13N15.

Key words and phrases. UP-algebras, Generalized symmetric bi-derivations, Trace, BCC-algebras.

- [14] Gy. Maksa, On the trace of symmetric bi-derivations, *Can. Math. Bull.* 9: 303-307 (1987).
- [15] G. Muhiuddin, A. M. Al-roqi, Y. B. Jun, Y. Cevan, On symmetric left bi-derivations in BCI-algebras, *International Journal of Mathematics and Mathematical Sciences*, 2013, 1-6 2013.
- [16] H. Ono, Y. Komori, Logics without the contraction rule, *The Journal of Symbolic Logic*, 50(1), 169-201 (1985).
- [17] M. A. Ozturk, Y. Cevan, Y. B. Jun, Generalized derivations of BCI-algebras, *Honam Mathematical Journal*, 31(4), 601-609 (2009).
- [18] C. Prabpayak, U. Leerawat, On derivations of BCC-algebras, *Agriculture and Natural Resources*, 43(2), 398-401.
- [19] E. C. Posner, Derivation in prime rings, *Proc. Am. Math. Soc.* 8, 1093-1100, (1957).
- [20] K. Sawika et al. Derivations of UP-algebras, *The Korean Journal of Mathematics*, 24(3), 345-367 (2016).
- [21] T. Tippanya et al. A new derivation of UP-algebras by means of UP-endomorphisms, *Algebra Lett.*, 2017: Article ID 4, 2017.
- [22] D. Yilmaz, Symmetric Bi-derivations of UP(BCC)-Algebras, Submitted to the *Journal of Applied Non-Classical Logics*, (2023).

ERZURUM TECHNICAL UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF MATHEMATICS,
ERZURUM, TURKEY

Email address: damla.yilmaz@erzurum.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 130

A NOTE ON FUZZY PRODUCT RULE

TAHIR CEYLAN

ABSTRACT

In this study, the author considers a different method to product rule of fuzzy numbers. The basic properties and inclusions about this method are given. Finally, the author presents some examples to compare the properties.

REFERENCES

- [1] M. Zeinali, F. Maheri, Fuzzy product rule with applications, Iranian Journal of Fuzzy Systems, Vol. 19, N. 6, pp. 75–92 (2022). DOI: 10.22111/IJFS.2022.7211.
- [2] W.Cong-Xin, M.Ming, Embedding problem of fuzzy number space: partI, Fuzzy Sets and Systems, Vol.44, pp. 33–38 (1991).
- [3] M. Friedman, M. Ming, A. Kandel, Fuzzy linear systems, Fuzzy Sets and Systems, Vol. 96, N. 2, pp. 201–209 (1998).
- [4] A. I. Ban and B. Bede: Properties of the cross product of fuzzy numbers. J. Fuzzy Math. 14 (2006), 513-531.
- [5] A. I. Ban and B. Bede, Properties of the cross product of fuzzy numbers, J. Fuzzy Math., Vol. 14, pp. 513-531 (1998).
- [6] R. Goetschel and W. Voxman: Elementary fuzzy calculus. Fuzzy Sets Syst. 18 (1986), 31-43.
- [7] R. Goetschel, W. Voxman, Elementary fuzzy calculus, Fuzzy Sets and Systems, Vol. 18, pp. 31-43 (1986). DOI:10.1016/0165-0114(86)90026-6
- [8] L. Stefanini, L. Sorini, M. L. Guerra, Parametric representation of fuzzy numbers and application to fuzzy calculus, Fuzzy Sets and Systems, Vol. 157, pp. 2423-2455 (2006). DOI:10.1016/j.fss.2006.02.002
- [9] A. Taleshian, S. Rezvani, Multiplication operation on trapezoidal fuzzy numbers, J. Phys. Sci., Vol. 15, pp. 17-26 (2011).

DEPARTMENT OF MATHEMATICS, FACULTY OF ARTS AND SCIENCES, SINOP UNIVERSITY, SINOP,
TÜRKİYE
Email address: tceylan@gmail.com

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 03E72; 28E10.

Key words and phrases. Fuzzy number, Fuzzy arithmetic.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 131-132

VISLIT-TEST: DESIGNING EFFECTIVE VISUALIZATION LITERACY ASSESSMENT TEST

ELIF E. FIRAT

0000-0001-9497-7928

ABSTRACT

Data volume and complexity continue to increase, and the ability to comprehend and interpret visual representations becomes crucial for making informed decisions and identifying meaningful insights. Understanding the ability of users to analyze and extract relevant insights from visuals requires evaluating their visualization literacy skills. However, creating an efficient visualization literacy assessment test is a non-trivial task. This paper recommends key practices for creating assessment tests to gauge users' visualization literacy skills. These practices are presented based on designing an effective visualization literacy assessment and the structure of the literacy test.

REFERENCES

- [1] Katy Börner, Adam Maltese, Russell Nelson Balliet, and Joe Heimlich. Investigating aspects of data visualization literacy using 20 information visualizations and 273 science museum visitors. *Information Visualization*, 15(3):198–213, (2016).
- [2] Jeremy Boy, Ronald A Rensink, Enrico Bertini, and Jean-Daniel Fekete. A principled way of assessing visualization literacy. *IEEE Transactions on Visualization and Computer Graphics*, 20(12):1963–1972, (2014).
- [3] Saugat Pandey and Alvitta Ottley. Mini-vlat: A short and effective measure of visualization literacy. *Computer Graphics Forum*, 42(3):1–11, (2023).
- [4] Sukwon Lee, Sung-Hee Kim, and Bum Chul Kwon. Vlat: Development of a visualization literacy assessment test. *IEEE Transactions on Visualization and Computer Graphics*, 23(1):551–560, (2017).
- [5] Elif E. Firat, Alena Denisova, and Robert S. Laramee. Treemap Literacy: A Classroom-Based Investigation. In *Eurographics 2020 - Education Papers*, pages 29–38, (2020).
- [6] Elif E Firat, Alena Denisova, Max L Wilson, and Robert S Laramee. P-lite: A study of parallel coordinate plot literacy. *Visual Informatics*, 6(3):81–99, (2022).
- [7] Robert Delmas, Joan Garfield, and Ann Ooms. Using assessment items to study students' difficulty reading and interpreting graphical representations of distributions. In *Fourth Forum on Statistical Reasoning, Thinking, and Literacy (SRTL-4)*, (2005).

Date: July, 8, 2023.

Key words and phrases. Information visualization, Visualization literacy.

CUKUROVA UNIVERSITY, COMPUTER ENGINEERING DEPARTMENT 01380, ADANA, TÜRKİYE
Email address: elifemelfirat@gmail.com

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 133-134

**A GUIDELINE TO DESIGNING CROWDSOURCED ONLINE
EXPERIMENTS FOR EVALUATING VISUALIZATION
LITERACY**

ELIF E. FIRAT

0000-0001-9497-7928

ABSTRACT

As data becomes increasingly complex, comprehending and interpreting visual representations becomes essential for informed decision-making and valuable insights. With visualizations gaining significance across various domains, it is vital to effectively assess users' visualization literacy skills and provide opportunities to enhance them. This paper offers a comprehensive guide on organizing online experiments for evaluating visualization literacy, leveraging advantages such as scalability and accessibility, and reaching a diverse participant pool. However, successfully organising these experiments requires planning and considering various factors. The paper outlines practices and considerations for online experiments to evaluate visualization literacy.

REFERENCES

- [1] Elif E. Firat, Alena Denisova, and Robert S. Laramee. Treemap Literacy: A Classroom-Based Investigation. In *Eurographics 2020 - Education Papers*, pages 29–38, (2020).
- [2] Elif E Firat, Alark Joshi, and Robert S Laramee. Interactive visualization literacy: The state-of-the-art. *Information Visualization*, 21(3):285–310, (2022).
- [3] Rita Borgo, Bongshin Lee, Benjamin Bach, Sara Fabrikant, Radu Jianu, Andreas Kerren, Stephen Kobourov, Fintan McGee, Luana Micallef, Tatiana von Landesberger, et al. Crowdsourcing for information visualization: Promises and pitfalls. In *Evaluation in the Crowd. Crowdsourcing and Human-Centered Experiments: Dagstuhl Seminar 15481, Dagstuhl Castle, Germany, November 22–27, 2015, Revised Contributions*, pages 96–138. Springer, (2017).
- [4] Rita Borgo, Luana Micallef, Benjamin Bach, Fintan McGee, and Bongshin Lee. Information visualization evaluation using crowdsourcing. In *Computer Graphics Forum*, volume 37, pages 573–595. Wiley Online Library, (2018).
- [5] Jeremy Boy, Ronald A Rensink, Enrico Bertini, and Jean-Daniel Fekete. A principled way of assessing visualization literacy. *IEEE Transactions on Visualization and Computer Graphics*, 20(12):1963–1972, (2014).
- [6] Amazon Mechanical Turk. <https://www.mturk.com>, 2023. Last Accessed: June, (2023).

Date: July, 8, 2023.

Key words and phrases. Information visualization, Visualization literacy.

- [7] Puripant Ruchikachorn and Klaus Mueller. Learning visualizations by analogy: Promoting visual literacy through visualization morphing. *IEEE Transactions on Visualization and Computer Graphics*, 21(9):1028–1044, (2015).
- [8] Bum Chul Kwon and Bongshin Lee. A comparative evaluation on online learning approaches using parallel coordinate visualization. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*, pages 933–997. ACM, (2016).
- [9] Elif E Firat, Ben Swallow, and Robert S. Laramee. Pcp-ed: Parallel coordinate plots for ensemble data. *Visual Informatics*, 7(1):56–65, (2023).
- [10] Qualtrics. <https://www.qualtrics.com/>, 2023. Last Accessed: June, (2023).
- [11] Stefan Palan and Christian Schitter. Prolific. ac—a subject pool for online experiments. *Journal of Behavioral and Experimental Finance*, 17:22–27, (2018).

CUKUROVA UNIVERSITY, COMPUTER ENGINEERING DEPARTMENT, 01380, ADANA, TÜRKIYE
Email address: elifefirat@gmail.com

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 135-136

MIXED INTEGER LINEAR PROGRAMMING MODEL FOR OPTIMIZING UNIVERSITY EXAM SCHEDULES

H. ALUNIMA, B. PEKTAŞ, N. KOPACAK, AND O. SIMSEK

0000-0002-8982-2633, 0000-0001-9909-370X, 0000-0003-1121-1180 and 0000-0002-7968-1384

ABSTRACT

Examinations are a critical aspect of education as they provide a systematic and measurable method of evaluating a student's knowledge, understanding, and skills. Consequently, the exam timetable is a vital tool that determines the dates, times, and venues for each exam. However, developing an exam timetable is a complex process that involves considering several factors to ensure a hassle-free and comfortable exam period. This study aims to design a multiobjective optimization model that takes into account various considerations, such as the maximum possible interval between exams for students at the same level, no overlapping exams for the same faculty, teacher availability, sufficient room capacity for each exam, an appropriate schedule for online exams, and manually set exam dates. The developed model has two main objectives: a) maximum duration between exams, b) lowest number of occupied venues and staff at the same time. To evaluate the effectiveness of the generated timetable, the model was used to schedule the final exams for the fall semester 2022-2023 at the main campus of Uskudar University. The findings indicated that there was no overlap between exams for students at the same level, and the time gaps between exams were extended as much as possible, while taking into account specific constraints like teacher availability and venue capacity. A survey was also conducted among the students to gauge their satisfaction level. Despite being selective about exams, 53% of the regular students found the timetable to be more convenient and less stressful than the previous year, with none reporting it to be more stressful, while the remaining students did not notice any discernible difference.

Date: July, 8, 2023.

Key words and phrases. Mixed Integer Linear Programming, Multi Objective Optimization, Exam timetable, Scheduling, Optimization.

We would like to dedicate this work to the Faculty of Engineering and Natural Sciences at Uskudar University for the endless support.

REFERENCES

- [1] A. Muklason, R. G. Irianti, and A. Marom, "Automated Course Timetabling Optimization Using Tabu-Variable Neighborhood Search Based Hyper-Heuristic Algorithm," *Procedia Computer Science*, vol. 161, pp. 656-664, 2019. ISSN 1877-0509, doi: 10.1016/j.procs.2019.11.169.
- [2] M. Y. Lin, K. S. Chin, K. L. Tsui, and T. C. Wong, "Genetic based discrete particle swarm optimization for Elderly Day Care Center timetabling," *Computers and Operations Research*, vol. 65, pp. 125-138, 2016. ISSN 0305-0548, doi: 10.1016/j.cor.2015.07.010.
- [3] S. Larabi-Marie-Sainte, "A new hybrid particle swarm optimization algorithm for real-world university examination timetabling problem," in *2017 Computing Conference*, 2017, pp. 157-163. doi: 10.1109/SAI.2017.8252097.
- [4] T. Elsaka, "Autonomous generation of conflict-free examination timetable using constraint satisfaction modelling," in *2017 International Artificial Intelligence and Data Processing Symposium (IDAP)*, 2017, pp. 4-10. doi: 10.1109/IDAP.2017.8090236.
- [5] M. A. Ahandan, M. T. Wakil Baghmisheh, M. A. Badamchi Zadeh, and S. Ghaemi, "Hybrid particle swarm optimization transplanted into a hyper-heuristic structure for solving examination timetabling problem," *Swarm and Evolutionary Computation*, vol. 7, pp. 21-34, 2012. ISSN 2210-6502, doi: 10.1016/j.swevo.2012.06.004.
- [6] I. X. Tassopoulos and G. N. Beligiannis, "Solving effectively the school timetabling problem using particle swarm optimization," *Expert Systems with Applications*, vol. 39, no. 5, pp. 6029-6040, 2012. ISSN 0957-4174, doi: 10.1016/j.eswa.2011.12.013.
- [7] C. W. Fong, H. Asmuni, and B. McCollum, "A Hybrid Swarm-Based Approach to University Timetabling," *IEEE Transactions on Evolutionary Computation*, vol. 19, no. 6, pp. 870-884, 2015. doi: 10.1109/TEVC.2015.2411741.
- [8] P. Pongcharoen, W. Promtet, P. Yenradee, and C. Hicks, "Stochastic Optimisation Timetabling Tool for university course scheduling," *International Journal of Production Economics*, vol. 112, no. 2, pp. 903-918, 2008. doi: 10.1016/j.ijpe.2007.07.009.

(H. ABUNIMA) ÜSKÜDAR UNIVERSITY, DEPARTMENT OF ELECTRICAL-ELECTRONICS ENGINEERING, 34662, ISTANBUL, TURKEY

Email address: hamza.abunima@uskudar.edu.tr

(B. PEKTAŞ) ÜSKÜDAR UNIVERSITY, DEPARTMENT OF COMPUTER ENGINEERING, 34662, ISTANBUL, TURKEY

Email address: burhan.pektas@uskudar.edu.tr

(N. KOPACAK) ÜSKÜDAR UNIVERSITY, DEPARTMENT OF ELECTRICAL-ELECTRONICS ENGINEERING, 34662, ISTANBUL, TURKEY

Email address: nazmiye.kopacak@uskudar.edu.tr

(O. SIMSEK) ÜSKÜDAR UNIVERSITY, DEPARTMENT OF CHEMICAL ENGINEERING, 34662, ISTANBUL, TURKEY

Email address: ozlem.simsek@uskudar.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 137

DECOMPOSITIONS AND INVERSES OF SOME LOWER TRIANGULAR MATRICES

CAHİT KÖME AND KADİR HİLAL

0000-0002-6488-9035 and 0000-0002-7850-7819

ABSTRACT

Matrix decompositions have been a trending study topic that has attracted attention by many researchers in order to facilitate the solutions of engineering and mathematical problems in recent years. In this paper, by using some analytical techniques, we obtain the inverse of some lower triangular matrices. We give decompositions of these type matrices via generalized Fibonomial type matrices of the first and of the second kind. We derive several newly identities and provide more generalized results by virtue of these type matrices. Finally, we compare the performance of our results with the results obtained with MATHEMATICA's Inverse method.

REFERENCES

- [1] P. Stanimirović, J. Nikolov & I. Stanimirović, A generalization of Fibonacci and Lucas matrices, *Discrete applied mathematics*, 156(14), 2606–2619, (2008).
- [2] Z. Zhang & Y. Zhang, The Lucas matrix and some combinatorial identities, *Indian Journal of Pure and Applied Mathematics*, 38(5), 457–465, (2007).
- [3] G. Y. Lee, J. S. Kim & S. H. Cho, Some combinatorial identities via Fibonacci numbers, *Discrete applied mathematics*, 130(3), 527–534, (2003).
- [4] C. Köme, Factorizations of some lower triangular matrices and related combinatorial identities, *Notes on Number Theory and Discrete Mathematics*, 27(4), 207–218, (2021).
- [5] C. Köme, Factorizations and eigenvalues of the (r, k) -bonacci matrices, *Comp. Appl. Math.* 42(185), 1–16, (2023).

NEVŞEHİR HACI BEKTAŞ VELİ UNIVERSITY, DEPARTMENT OF MATHEMATICS, 50300, NEVŞEHİR, TURKEY.

Email address: cahit@nevsehir.edu.tr

MINISTRY OF NATIONAL EDUCATION, 50300, NEVŞEHİR, TURKEY.

Email address: kadirhilal@hotmail.com

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 15A23; 05A10; 11B39.

Key words and phrases. Matrix Inverse, Matrix Decomposition, Pascal Matrix, Fibonacci Matrix.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 138

**ON A NEW CLASS OF HYPERBOLIC FIBONACCI FUNCTIONS
VIA SOME SPECIAL POLYNOMIALS**

SURE KÖME AND YASİN YAZLIK

0000-0002-3558-0557 and 0000-0001-6369-540X

ABSTRACT

In recent years, many researchers have studied hyperbolic Fibonacci functions and some special polynomials, which are important areas of mathematics. In this study, we give an extension of the Euler polynomials in order to obtain the correlation between the hyperbolic Fibonacci functions and Euler polynomials. We define symmetrical Fibonacci sine and symmetrical Fibonacci cosine functions for some special Euler polynomials. Moreover, we derive new identities for these types of symmetrical Fibonacci functions by using analytical techniques.

REFERENCES

- [1] T. Koshy, Fibonacci and Lucas numbers with applications, (2001).
- [2] A. Stakhov and B. Rozin, On an new class of hyperbolic functions, Chaos, Solitons & Fractals, Vol.23, N.2, pp.379-389 (2005).
- [3] Q.-M. Luo, F. Qi and L. Debnath, Generalizations of Euler numbers and polynomials, International Journal of Mathematics and Mathematical sciences, Vol.2003, No.61, pp.3893-3901, (2003).
- [4] H. Srivastava, M. Garg and S. Choudhary, Some new families of generalized Euler and Genocchi polynomials, Taiwanese Journal of Mathematics, Vol.15, No.1, pp.283-305, (2011).

NEVŞEHİR HACI BEKTAŞ VELİ UNIVERSITY, DEPARTMENT OF MATHEMATICS, 50300, NEVŞEHİR, TURKEY

Email address: sure.kome@nevsehir.edu.tr

NEVŞEHİR HACI BEKTAŞ VELİ UNIVERSITY, DEPARTMENT OF MATHEMATICS, 50300, NEVŞEHİR, TURKEY

Email address: yyazlik@nevsehir.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 11B68, 11B39, 11C08.

Key words and phrases. Hyperbolic Fibonacci functions, Euler numbers, Euler polynomials.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 139-140

ON INTUITIONISTIC FUZZY PRIMARY DECOMPOSITION OF INTUITIONISTIC FUZZY IDEALS

P.K. SHARMA

This paper is dedicated to Prof. K.T. Atanassov.

ABSTRACT

In this presentation, we shall discuss the intuitionistic fuzzy version of the Lasker-Noether Decomposition Theorem, which states that every proper ideal in a Noetherian ring can be expressed as an irredundant intersection of finitely many primary ideals and that any two of such decompositions yield the same set of radical ideals. To establish the above result, we first introduce the notion of intuitionistic fuzzy primary ideals of a ring and obtained many results about it. We also give an example of an intuitionistic fuzzy ideal in a ring that cannot be written as an intersection of a finite number of intuitionistic fuzzy primary ideals.

REFERENCES

- [1] Atanassov, K.T., (1983), Intuitionistic fuzzy sets, In: Sgurev v(ed) vii ITKR's session, Central Science and Technology Library of the Bulgarian Academy of Sci, Sofia.
- [2] Atanassov, K.T., (1986), Intuitionistic fuzzy sets, Fuzzy Sets and Systems, 20(1), 87-96.
- [3] Atanassov, K.T., (1999), Intuitionistic Fuzzy Sets Theory and Applications, Studies on Fuzziness and Soft Computing, 35, Physica-Verlag, Heidelberg.
- [4] Bakhadach, I., Melliani, S., Oukessou M., and Chadli, S.L., (2016), Intuitionistic fuzzy ideal and intuitionistic fuzzy prime ideal in a ring, Notes on Intuitionistic Fuzzy Sets, 22(2), 59-63.
- [5] Basnet, D.K., (2011), Topics in intuitionistic fuzzy algebra, Lambert Academic Publishing, ISBN: 978-3-8443-9147-3
- [6] Biswas, R., (1989), Intuitionistic fuzzy subgroup, Mathematical Forum X, 37-46.
- [7] Hur H., Su Y.J., Kang H.W., (2005), Intuitionistic fuzzy ideal of a ring, J. Korea Soc. Math. Educ. Ser. B : Pure Appl. Math. , 12(3), 193-209.
- [8] Jun, Y.B., zturk, M. A. O., and Park, C. H. (2007), Intuitionistic nil radicals of intuitionistic fuzzy ideals and Euclidean intuitionistic fuzzy ideals in rings, Information Sciences, 177, 4662-4677.
- [9] Liu W.J., (1982), Fuzzy invariant subgroups and fuzzy ideals, Fuzzy Sets and Systems, 8, 132-139.

Date: July, 8, 2023.

2020 Mathematics Subject Classification. 08A72, 03F55; 16D25, 16D70.

Key words and phrases. Intuitionistic fuzzy set, Intuitionistic fuzzy point, Intuitionistic fuzzy ideal, Intuitionistic fuzzy primary ideal, (Minimal) Intuitionistic fuzzy primary decomposition, Intuitionistic fuzzy associated prime ideal.

- [10] Malik D. S., and Mordeson, J. N. (1991), Fuzzy primary representations of fuzzy ideals, *Inf. Sci.*, 55, 151-165.
- [11] Mordeson, J.N., Malik, D.S., (1998), *Fuzzy Commutative Algebra*, World Scientific publishing Co. Pvt. Ltd.
- [12] Palanivelrajan M., and Nandakumar S., (2012), Some operations of intuitionistic fuzzy primary and semi-primary ideal, *Asian Journal of Algebra* 5(2), 44-49.
- [13] Rosenfeld A., (1971), Fuzzy group, *J. Math. Anal. Appl.*, 35, 512-571.
- [14] Sharma P.K., and Kaur, Gagandeep, (2017), Residual quotient and annihilator of intuitionistic fuzzy sets of ring and module, *International Journal of Computer Science and Information Technology (IJCSIT)*, 9(4), 1-5.
- [15] Sharma P.K., and Kaur, Gagandeep, (2017), Intuitionistic fuzzy prime spectrum of a ring, *CiiT International Journal of Fuzzy Systems*, 9(8), 167-175.
- [16] Swamy U. M., and Swamy V. L. N., (1988), Fuzzy Prime Ideals of Rings, *Journal of Mathematical Analysis and Applications*, 134, 94-103.
- [17] Zadeh, L. A., (1965), Fuzzy sets, *Inform. Control.*, 8, 338-353.

POST-GRADUATE DEPARTMENT OF MATHEMATICS, D.A.V. COLLEGE, JALANDHAR, PUNJAB, INDIA.

Email address pksharma@davjalandhar.com

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 141

**APPLICATIONS OF SELECTION, DETERMINATION AND
DECISION MAKING IN EDUCATION WITH THE HELP OF
FUZZY LOGIC**

ALI SİNAR, ERHAN ÇETINKAYA, AND AHU MERYEM CUVALCIOĞLU

ABSTRACT

After the fuzzy sets were defined by Zadeh, they attracted the attention of many researchers both in theory and in practice. In recent years, the expression of decision-making methods with fuzzy sets has created a brand new perspective in application areas. In this study, fuzzy decision making methods in the field of education were examined and decision making application was made with the help of fuzzy logic. Student achievement, selection, determination and placement stages in the field of education were researched with fuzzy decision making methods.

REFERENCES

- [1] L.A. Zadeh, Fuzzy Sets, Information and Control, 8, 338-353, (1965).
- [2] G. Çuvalcıoğlu, Some Properties of Controlled Set Theory, Notes on Intuitionistic Fuzzy Sets, 20(2), 37-42, (2014).
- [3] M. Majumder, Multi Criteria Decision Making, Chapter 2, Springer, 35-47, (2015).

(Ali Sınar) 15 TEMMUZ ŞEHİTLERİ SECONDARY SCHOOL, MEZITLI, MERSİN, TÜRKİYE
Email address: sinarali33@gmail.com

(Erhan Çetinkaya) 15 TEMMUZ ŞEHİTLERİ SECONDARY SCHOOL, MEZITLI, MERSİN, TÜRKİYE
Email address: erhan.ctnky@gmail.com

(Ahu Meryem Cuvalcıoğlu) 15 TEMMUZ ŞEHİTLERİ SECONDARY SCHOOL, MEZITLI, MERSİN,
TÜRKİYE

Date: July, 8, 2023.
2000 Mathematics Subject Classification. 90B50.
Key words and phrases. Fuzzy sets, Decision Making.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 142

A MAXIMAL TYPE OF ZAGREB INDEX

B. AYDIN AND N. AKGÜNEŞ

ABSTRACT

In this paper we introduced a new type of Zagreb index. Results over special graphs have been obtained. Also some graph transformations have been defined then extremal maximal Zagreb indices have been found.

REFERENCES

- [1] J. A. Bondy and U. S. Murty, Graph Theory, vol. 244 of Graduate Texts in Mathematics, Springer, Berlin, Germany, (2008).
- [2] K. Xu and H. Hua, A Unified Approach to Extremal Multiplicative Zagreb Indices for Trees, Unicyclic and Bicyclic Graphs, MATCH Communications in Mathematical and in Computer Chemistry, vol. 68, pp. 241-256, (2012).
- [3] K. Xu and K. C. Das, Trees, unicyclic and bicyclic graphs extremal with respect to multiplicative sum zagreb index, MATCH Commun. Math. Comput. Chem. 68, 257, (2012).

(B. AYDIN) KONYA NECMETTİN ERBAKAN UNIVERSITY, DEPARTMENT OF MATHEMATICS-COMPUTER SCIENCES, 42090, KONYA, TURKEY

Email address: bsrcgn@gmail.com

(N. Akgüneş) KONYA NECMETTİN ERBAKAN UNIVERSITY, DEPARTMENT OF MATHEMATICS-COMPUTER SCIENCES, 42090, KONYA, TURKEY

Email address: nakgunes@erbakan.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 05C07, 05C12; 05C75, 05C90.

Key words and phrases. Graph, Maximal Zagreb index, Zagreb index.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 143

EXAMPLES AND APPLICATIONS OF DECISION MAKING IN THE FIELD OF EDUCATION USING INTUITIONISTIC FUZZY SETS

ERHAN ÇETINKAYA, ALI SİNAR, AND AHU MERYEM CUVALCIOĞLU

ABSTRACT

Since intuitionistic fuzzy sets contain membership, non-membership and hesitation degrees together, they give very effective results in the decision-making part of many application areas, such as education, medicine, engineering. In this study, decision making applications made with the help of intuitionistic fuzzy sets in the field of education were examined. In this study, decision making methods were researched, a decision-making practice in which students and teachers were evaluated in education was made by using intuitionistic fuzzy sets in the field of education.

REFERENCES

- [1] K. T. Atanassov, Intuitionistic Fuzzy Sets, VII ITKR Session, Sofia, 20-23 June (1983), (Deposited in Centr. Sci.-Techn. Library of the Bulg. Acad. of Sci., 1697/84) (in Bulgarian). Reprinted: Int. J. Bioautomation 20(S1), 1-6, (2016).
- [2] G. Çuvalcıoğlu, Some Properties of Controlled Set Theory, Notes on Intuitionistic Fuzzy Sets, 20(2), 37-42, (2014).
- [3] M. Majumder, Multi Criteria Decision Making, Chapter 2, Springer, 35-47, (2015).

(Erhan Çetinkaya) 15 TEMMUZ ŞEHİTLERİ SECONDARY SCHOOL, MEZITLI, MERSİN, TÜRKİYE
Email address: erhan.ctnky@gmail.com

(Ali Sınar) 15 TEMMUZ ŞEHİTLERİ SECONDARY SCHOOL, MEZITLI, MERSİN, TÜRKİYE
Email address: sinarali33@gmail.com

(Ahu Meryem Cuvalcıoğlu) 15 TEMMUZ ŞEHİTLERİ SECONDARY SCHOOL, MEZITLI, MERSİN,
TÜRKİYE

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 90B50.

Key words and phrases. Intuitionistic Fuzzy sets, Decision Making.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 144-145

**BRIEF QUALITATIVE PROPERTIES OF THE REGULARIZED
PRABHAKAR FRACTIONAL SYSTEM**

MUSTAFA AYDIN

0000-0003-0132-9636

ABSTRACT

In this study, developing and changing real-world problems force to improve or generalize the available concepts and produce new notions. The concept of the fractional derivative is a production of this reality, that is, a fractional derivative means that the derivative has a fractional order, which is a generalization of an integer-order derivative. Until the last two decades, contributions of the integer calculus (traditional calculus) whose keystone is the integer-order derivative to the scientific world are undeniable. But, in the last two decades, fractional calculus whose keystone is the fractional derivative apparently has become more apparent in the scientific world. Of course, everyone can put forward lots of reasons for that. It is surely beyond doubt that one of these reasons is that almost all of the obtained findings for fractional calculus are also in effect for traditional calculus. Another important one may be the fact that most of the problems of today can be formulated more suitably by virtue of fractional calculus according to traditional calculus. Nowadays, fractional calculus has been applied so many sorts of areas such as control theory, biophysics, engineering, signal, electrochemistry, mathematical physics, etc; see [1]-[7]. The Prabhakar fractional derivative which is the keystone of Prabhakar fractional calculus [8]-[13] is a quite new and comprehensive definition containing many of the available fractional derivatives such as the Lorenzo-Hartly, Gorenflo-Minerdi, the Miller-Ros, Riemann-Liouville, Caputo fractional operators, etc. The following Prabhakar system in the reference [14]

$$\begin{cases} {}^{PC}D_{0+}^{A,\delta} v(t) = Bv(t) + f(t, v(t)), & t \in (0, T], \\ v(0) = v_0 \end{cases}$$

where ${}^C D_{0+}^{A,\delta}$ stands for the regularized Prabhakar Caputo-type derivative of fractional order $0 < \beta < 1$, $A, B \in \mathbb{R}^{n \times n}$ is studied its asymptotic stability analysis.

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 26A33; 34A08; 34A12, 34Dxx, 93Bxx.

Key words and phrases. Prabhakar fractional calculus, Existence and uniqueness, Stability and controllability.

Inspired by the above-cited works, we will investigate the existence and uniqueness of solutions to the system. We will also examine its stability and controllability.

REFERENCES

- [1] A. D. Obembe, M.E. Hossain, S. A. Abu-Khalasin SA, Variable-order derivative time fractional diffusion model for heterogeneous porous media, *Journal of Petroleum Science and Engineering*, Vol.152, pp.391-405 (2017).
- [2] C. F. M. Coimbra, Mechanics with variable-order differential operators, *Annals Physics*, Vol.12, pp.692–703 (2003).
- [3] N. Heymans, I. Podlubny, Physical interpretation of initial conditions for fractional differential equations with Riemann-Liouville fractional derivatives, *Rheologica Acta*, Vol.45, pp.765–771 (2006).
- [4] N. H. Sweilam, S.M.A. Mekhlafi, Numerical study for multi-strain tuberculosis (TB) model of variable-order fractional derivatives, *Journal of Advanced Research*, Vol.7, pp.271–283 (2016).
- [5] K. Diethelm, *The Analysis of Fractional Differential Equations*, Springer: Berlin, Germany. (2010).
- [6] A. A. Kilbas, H. M. Srivastava, J. J. Trujillo, *Theory and Applications of Fractional Differential Equations*, Elsevier Science BV: Amsterdam, The Netherlands. (2006).
- [7] V. Tomovski, *Handbook of Fractional Calculus with Applications*, de Gruyter: Berlin, Germany. (2019).
- [8] T. R. Prabhakar, A singular integral equation with a generalized Mittag-Leffler function in the kernel, *Yokohama Mathematical Journal*, Vol.19, pp.7–15 (1971).
- [9] A. A. Kilbas, M. Saigo, R.K. Saxena, Generalized Mittag-Leffler function and generalized fractional calculus operators, *Integral Transforms and Special Functions*, Vol.15, No.1, pp.31–49 (2004).
- [10] R. Garra, R. Gorenflo, F. Polito, Z. Tomovski, Hilfer–Prabhakar derivatives and some applications, *Applied Mathematics and Computation*, Vol.242 pp. 576–589 (2014).
- [11] A. Fernandez, D. Baleanu, Classes of Operators in Fractional Calculus: A Case Study, *Mathematical Methods in the Applied Sciences*, Vol.44, No.11, pp.9143–9162 (2021).
- [12] A. Giusti, I. Colombaro, R. Garra, R. Garrappa, F. Polito, M. Popolizio, F. Mainardi, A practical guide to Prabhakar fractional calculus, *Fractional Calculus and Applied Analysis*, Vol.23, No.1, pp.9–54 (2020).
- [13] Z. Tomovski and J. L. A. Dubbeldam, J. Korbel, Applications of Hilfer–Prabhakar operator to option pricing financial model, *Fractional Calculus and Applied Analysis*, Vol.23, No.4, pp.996–1012 (2020).
- [14] S. Eshaghi, R. K. Ghaziani, A. Ansari, Stability and dynamics of neutral and integro-differential regularized Prabhakar fractional, *Computational and Applied Mathematics differential systems*, Vol.39, No.4, pp.1-21 (2020).

YUZUNCU YIL UNIVERSITY, MEDICAL SERVICES AND TECHNIQUES DEPARTMENT, VAN, TURKEY
Email address: m.aydin@yyu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 146-147

**RELATIVE CONTROLLABILITY OF THE μ -CAPUTO
FRACTIONAL DELAYED SYSTEM WITH IMPULSES**

MUSTAFA AYDIN

0000-0003-0132-9636

ABSTRACT

In this paper we consider the impulsive fractional delayed differential system with the Caputo derivative with respect to another function. We determine an explicit solution in the light of the available studies in this subject and discuss its existence and uniqueness. we investigate stability and controllability of the given system.

REFERENCES

- [1] N. I. Mahmudov, Delayed perturbation of Mittag-Leffler functions and their applications to fractional linear delay differential equations, *Mathematical Methods in the Applied Sciences*, vol.42, pp.5489–5497, (2019).
- [2] M. Aydın, N.I. Mahmudov, H. Aktuğlu, E. Baytuñ, M.S. Atamert, On a study of the representation of solutions of a Ψ -Caputo fractional differential equations with a single delay, *Electronic Research Archive*, vol.30, pp.1016–1034, (2022).
- [3] A. Mustafa, N.I. Mahmudov, Iterative learning control for impulsive fractional order time-delay systems with nonpermutable constant coefficient matrices, *International Journal of Adaptive Control and Signal Processing*, vol.36, N.1, pp.1419–1438, (2022).
- [4] D. Y. Khusainov, G. V. Shuklin, Linear autonomous time-delay system with permutation matrices solving, *Stud Univ Žilina*, vol.17, pp.101–108, (2003).
- [5] M. Li, J.R. Wang, Exploring delayed Mittag-Leffler type matrix functions to study finite time stability of fractional delay differential equations, *Applied Mathematics and Computation*, vol.324, pp.254–265, (2018).
- [6] N.I. Mahmudov Multi-delayed perturbation of Mittag-Leffler type matrix functions, *Journal of Mathematical Analysis and Applications*, vol.505, 125589, (2022).
- [7] A.M. Elshenhab, X.T. Wang, Representation of solutions for linear fractional systems with pure delay and multiple delays, *Mathematical Methods in the Applied Sciences*, vol.44, pp.12835–12850, (2021).
- [8] A.M. Elshenhab, X.T. Wang, Representation of solutions of linear differential systems with pure delay and multiple delays with linear parts given by non-permutable matrices, *Applied Mathematics and Computation*, vol.410, 126443, (2021).
- [9] N.I. Mahmudov, M. Aydın, Representation of solutions of nonhomogeneous conformable fractional delay differential equations. *Chaos Solitons Fractals*, vol.150, 111190, (2021).

Date: July, 8, 2023.

Key words and phrases. Impulsive fractional delayed system, Existence uniqueness, Ulam-Hyers stability, Relative controllability.

- [10] N.I. Mahmudov, Representation of solutions of discrete linear delay systems with non-permutable matrices. *Applied Mathematics Letters*, vol.85, pp.8–14, (2018).
- [11] L. Liu, Q. Dong, G. Li, Exact solutions and Hyers-Ulam stability for fractional oscillation equations with pure delay, *Applied Mathematics Letters*, vol.112 106666, (2021).
- [12] C. Liang, J. Wang, D. O'Regan, Controllability of nonlinear delay oscillating systems, *Electronic Journal of Qualitative Theory of Differential Equations*, vol.2017, pp.1–18, (2017).
- [13] J. Wang, Z. Luo, M. Fečkan, Relative controllability of semilinear delay differential systems with linear parts defined by permutable matrices, *European Journal of Control*, vol.38, pp.39–6, (2017).
- [14] D.Y. Khusainov, G.V. Shakhlin, Relative controllability in systems with pure delay, *International Journal of Applied Mathematics*, vol.2, pp.210–221, (2005).
- [15] Z. You, M. Fečkan, J. Wang, Relative Controllability of Fractional Delay Differential Equations via Delayed Perturbations of Mittag-Leffler Functions, *Journal of Computational and Applied Mathematics*, vol.378, 112939, (2020). 10.1016/j.cam.2020.112939.
- [16] D.D. Bainov, and P.S. Simeonov, *Systems with Impulse Effect*. Ellis Horwood Series: Mathematics and its Applications, Ellis Horwood, Chichester, (1989).
- [17] D.D. Bainov, and P.S. Simeonov, *Impulsive Differential Equations: Periodic Solutions and Applications*, Pitman Monographs and Surveys in Pure and Applied Mathematics, vol. 66, Longman Scientific & Technical, Harlow; John Wiley & Sons, New York, (1993).
- [18] M. Lakshmikantham, D.D. Bainov, and P.S. Simeonov, *Theory of Impulsive Differential Equations*, Series in Modern Applied Mathematics, vol. 6, World Scientific, New Jersey, (1989).
- [19] A.M. Samoilenko, N.A. Perestyuk, *Impulsive Differential Equations*, World Scientific Series on Nonlinear Science. Series A: Monographs and Treatises, vol. 14, World Scientific, New Jersey, (1995). ISBN: 978-981-02-2416-5.

(Mustafa AYDIN) YUZUNCU YIL UNIVERSITY, DEPARTMENT OF MEDICAL SERVICES AND TECHNIQUES, 65080, VAN, TURKEY

Email address, author one: m.aydin@yyu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 148

SOME RESULTS ON DEFERRED CESÀRO STATISTICAL CONVERGENCE OF ORDER α IN THE PROBABILITY SPACES

U.DEĞER AND K. UZUN

ABSTRACT

The idea of statistical convergence, which is a generalization of the concept of convergence and is based on the natural density of positive integers, was first given independently in 1951 by H. Steinhaus and H. Fast ([1],[2]). In 2010, the concept of α -order statistical convergence was considered by R. Çolak [3]. Afterwards the concept of deferred Cesàro statistical convergence was discussed by M. Küçükaslan and M. Yılmaztürk in 2016 [4]. In this study, by considering these two facts, the concept of deferred Cesàro statistical convergence of order α has been discussed in probability spaces.

REFERENCES

- [1] H. Steinhaus, Sur la convergence ordinaire et la convergence asymptotique, Colloquium Mathematicum, Vol. 2, No. 1, pp. 73-74 (1951).
- [2] H. Fast, Sur la convergence statistique, Colloquium Mathematicum, Vol. 2, No. 3-4, pp. 241-244 (1951).
- [3] R. Çolak, 'Statistical convergence of order α , Modern Methods in Analysis and Its Applications, Vol. 1, pp. 121-129 (2010).
- [4] M. Küçükaslan and M. Yılmaztürk, On deferred statistical convergence of sequences, Kyungpook Mathematical Journal, Vol. 56, No. 2, pp. 357-366 (2016).

MERSIN UNIVERSITY, DEPARTMENT OF MATHEMATICS, 33330, MERSIN, TURKEY
Email address: udeger@mersin.edu.tr; degpar@gmail.com

MERSIN UNIVERSITY, INSTITUTE OF SCIENCE, 33330, MERSIN, TURKEY
Email address: kubraasoytok@gmail.com

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 40A35; 40G15.

Key words and phrases. Statistical convergence in probability, Deferred Cesàro method.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 149-151

**THE USE OF UNMANNED AERIAL VEHICLES IN THE 3D
DOCUMENTATION OF HISTORICAL AND CULTURAL
HERITAGE: THE CASE OF CEYHAN KURTKULAGI
CARAVANSERAI**

ENIS ARSLAN AND ALIİHSAN ŞEKERTEKİN

0000-0002-2609-3925 and 0000-0002-4715-5160

ABSTRACT

In parallel with technological developments, the usage areas of Unmanned Aerial Vehicles (UAVs) have been increasing day by day. As a result of its important contributions to the production of three-dimensional (3D) terrain models, it has reached an important point in the discipline of surveying engineering. Especially in 3D modeling and documentation of historical and cultural heritage, UAVs are advantageous tools in terms of time and cost when compared to classical methods. The aim of this study is to develop a 3D model of the Kurtkulagi Caravanserai, located in the Kurtkulagi town of Ceyhan District of Adana, using UAV and to reveal the importance of UAV in the documentation of this historical structure. In this context, according to a planned flight on the UAV, following the capture of the images of the caravanserai in a multiview aspect, a 3D model was produced as a metric by using photogrammetric methods with the help of software in the laboratory environment.

REFERENCES

- [1] Karachaliou, E., Georgiou, E., Psaltis, D., & Stylianidis, E. (2019). UAV for mapping historic buildings: From 3D modelling to BIM. ISPRS-International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences.
- [2] Gomes, L., Bellon, O. R. P., & Silva, L. (2014). 3D reconstruction methods for digital preservation of cultural heritage: A survey. Pattern Recognition Letters, 50, 3-14.
- [3] Barsanti, S. G., Remondino, F., Fenández-Palacios, B. J., & Visintini, D. (2014). Critical factors and guidelines for 3D surveying and modelling in Cultural Heritage. International Journal of Heritage in the Digital Era, 3(1), 141-158.
- [4] Murtiyoso, A., Grussenmeyer, P., Koehl, M., & Freville, T. (2016). Acquisition and processing experiences of close range UAV images for the 3D modeling of heritage buildings. In Digital

Date: July, 8, 2023.

This study is supported by Çukurova University Scientific Research Projects Coordination Unit under grant number: FBA-2020-12653.

- Heritage. Progress in Cultural Heritage: Documentation, Preservation, and Protection: 6th International Conference, EuroMed 2016, Nicosia, Cyprus, October 31–November 5, 2016, Proceedings, Part I 6 (pp. 420-431). Springer International Publishing.
- [5] Remondino, F., Del Pizzo, S., Kersten, T., & Troisi, S. (2012, October). Low-cost and open-source solutions for automated image orientation—A critical overview. In Euro-Mediterranean Conference (pp. 40-54). Springer, Berlin, Heidelberg.
- [6] Yakar, M., Toprak, A. S., Ulvi, A., & Uysal, M. (2015). Konya Beyşehir Bezariye Hanının (Bedesten) İhâ ile Fotogrametrik Teknik Kullanılarak Üç Boyutlu Modellenmesi. Türkiye Harita Bilimsel ve Teknik Kurultayı, 25-28 Mart 2015, Ankara. Ahmed, E.A., Adam, M.E.-N., (2013) Estimate of global solar radiation by using artificial neural network in Qena, Upper Egypt. *J. Clean Technol.* 2013, 1, 143–150.
- [7] Mirdan, O., & Yakar, M. (2015). Tarihi eserlerin İnsansız Hava Aracı ile modellenmesinde karşılaşılan sorunlar. *Geomatik*, 2(3), 118-125.
- [8] Mahmud, A. A., & Şimşek, H. M. (2018). Generating to Three Dimensional Models from Taken Photos in Vertical Position with Unmanned Aerial Vehicles: Aksaray University Campus Mosque. *Aksaray University Journal of Science and Engineering*, 2(2), 144-160.
- [9] Karachalios, I., Georgiou, E., Psaltis, D., & Stylianidis, E. (2019). UAV for mapping historic buildings: From 2D modelling to BIM. *ISPRS–International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*.
- [10] Korumaz, A. G., Korumaz, M., Tucci, G., Bonora, V., Niemeier, W., & Riedl, B. (2014, October). UAV systems for documentation of cultural heritage. In *ICONARCH I-International Congress of Architecture-Innovative Approaches in Architecture and Planning* (pp. 419-430).
- [11] Federman, A., Quintero, M. S., Kretz, S., Gregg, J., Lengies, M., Ouimet, C., & Liberte, J. (2017). UAV PHOTGRAMMETRIC WORKFLOWS: A BEST PRACTICE GUIDELINE. *International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences*, 42.
- [12] Nex, F., & Remondino, F. (2014). UAV for 3D mapping applications: a review. *Applied geomatics*, 6(1), 1-15.
- [13] Aicardi, I., Chiabrando, F., Grasso, N., Lingua, A. M., Noardo, F., & Spanò, A. (2016). UAV PHOTOGRAMMETRY WITH OBLIQUE IMAGES: FIRST ANALYSIS ON DATA ACQUISITION AND PROCESSING. *International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences*, 41.
- [14] Grussenmeyer, P., Hanke, K., & Streilein, A. (2002). 4.1 ARCHITECTURAL PHOTOGRAMMETRY. *Digital photogrammetry*, 300.
- [15] Pierrot-Deseilligny, M., De Luca, L., & Remondino, F. (2011). Automated image-based procedures for accurate artifacts 3D Modeling and orthoimage. *Journal of Geoinformatics FCE CTU*, 6(1), <http://geoinformatics>.
- [16] Nony, N., Luca, L. D., Godet, A., Pierrot-Deseilligny, M., Remondino, F., Dongen, A. V., & Vincitore, M. (2012, October). Protocols and assisted tools for effective image-based modeling of architectural elements. In Euro-Mediterranean Conference (pp. 432-439). Springer, Berlin, Heidelberg.
- [17] Murtiyoso, A., & Grussenmeyer, P. (2017). Documentation of heritage buildings using close-range UAV images: dense matching issues, comparison and case studies. *The Photogrammetric Record*, 32(159), 206-229.
- [18] Eisenbeiß, H. (2009). UAV photogrammetry.
- [19] Lowe, D. G. (2004). Distinctive image features from scale-invariant keypoints. *International journal of computer vision*, 60(2), 91-110.
- [20] Bay, H., Tuytelaars, T., & Gool, L. V. (2006, May). Surf: Speeded up robust features. In *European conference on computer vision* (pp. 404-417). Springer, Berlin, Heidelberg.
- [21] Hirschmuller, H. (2005, June). Accurate and efficient stereo processing by semi-global matching and mutual information. In *2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'05)* (Vol. 2, pp. 807-814). IEEE.
- [22] Chiabrando, F., Donadio, E., & Rinaudo, F. (2015). SfM for orthophoto to generation: A winning approach for cultural heritage knowledge. *The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences*, 40(5), 91.

THE USE OF UNMANNED AERIAL VEHICLES IN THE 3D DOCUMENTATION OF HISTORICAL AND CULTURAL HERITAGE

(Enis Arslan) DEPARTMENT OF COMPUTER ENGINEERING, ÇANAKKALE ONSEKİZ MART UNIVERSITY, 17020, ÇANAKKALE, TÜRKİYE.

Email address: enisarslan@gmail.com

(Alihsan Şekertekin) DEPARTMENT OF ARCHITECTURE AND TOWN PLANNING, İĞDIR UNIVERSITY, 76000, İĞDIR, TÜRKİYE.

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 152-153

A PETROV-GALERKIN METHOD FOR SOLVING THE GENERALIZED EQUAL WIDTH EQUATION

YUSUF TATLISU AND SEYDI BATTAL GAZI KARAKOC

ABSTRACT

This paper is interested in a Petrov-Galerkin method, in which element shape functions are quadratic and weight functions are linear B-splines to solve the generalized equal width (GEW) equation which is a significant nonlinear wave equation as it can be used to model a great many of problems occurring in applied sciences. As the analytic solution of this kind of equation can be obtained hardly, searching the numerical solution of the equation is of enormous importance. In this work firstly, a powerful Fourier series analysis has been applied and it is shown that our method is unconditionally stable. Furthermore, propagation of single and double solitary waves and evolution of solitons are analyzed to demonstrate the efficiency and applicability of the proposed numerical scheme by calculating the error norms L_2 , L_∞ . The three invariants (I_1 , I_2 and I_3) of motion have been commented to indicate the conservation features of the proposed algorithms. Our numerical algorithm is compared with other published methods and shown to be valid and effective.

REFERENCES

- [1] D. H. Peregrine, Calculations of the development of an undular bore, *J. Fluid Mech.*, 25, 321–330 (1996).
- [2] D. H. Peregrine, Long waves on a beach, *J. Fluid Mech.* 27, 815–827 (1967).
- [3] T. B. Benjamin, J. L. Bona, J. J. Mahony, Model equations for waves in nonlinear dispersive systems, *Philos. Trans. Royal Soc. London*, 227, 47–78 (1972).
- [4] H. Panahipour, Numerical simulation of GEW equation using RBF collocation method, 2012, 28 pages 2012. Doi:10.5899/2012/cna-00059
- [5] H. Zeybek, S. B. G. Karakoc, Application of the collocation method with B-splines to the GEW equation, *Electronic Transactions on Numerical Analysis*, 46, 71–88 2017.
- [6] T. Roshan, A Petrov–Galerkin method for solving the generalized regularized equal width (GEW) equation, *Journal of Computational and Applied Mathematics*, 235, 1641–1652 2011.

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 65N30, 65D07; 74S05, 76B25.

Key words and phrases. GEW equation, Petrov-Galerkin, Soliton.

(Y. Tatlısu) NEVSEHIR HACI BEKTAS VELI UNIVERSITY, DEPARTMENT OF MATHEMATICS, 50300,
NEVSEHIR, TURKIYE

Email address, Y. Tatlısu: tatlisuyusuf3450@hotmail.com

(S.B.G. Karakoc) NEVSEHIR HACI BEKTAS VELI UNIVERSITY, DEPARTMENT OF MATHEMATICS,
50300, NEVSEHIR, TURKIYE

Email address, S.B.G. Karakoc: sbg.karakoc@nevsehir.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 154

**A COMPROMISE SOLUTION TO THE MULTI-OBJECTIVE
SOLID TRANSPORTATION PROBLEM WITH THE UNCERTAIN
PARAMETERS**

SEDANUR AKTÜRK AND NURAN GÜZEL

ABSTRACT

In this study, a compromise solution to the multi-objective solid transportation problem (MOSTP), whose supplies, demands, costs, and carrying capacities are uncertain due to globalization and some uncontrollable effects, is examined by considering the satisfactory level of the decision maker. The inverse uncertain normal distribution is used to transform the uncertain parameters in the model into a deterministic model by taking the expected values of the objective functions and the confidence levels of the constraint functions. In order to increase the satisfaction level of the decision maker (DM), a compromise solution for MOSTP is obtained by using the fuzzy linear membership function and the goal programming problem with the upper and lower values in the desired goals of the DM. While the effectiveness of the proposed solution was demonstrated numerically, it is solved by using the MAPLE packet program.

REFERENCES

- [1] F. Jimenez, J.L. Verdegay, Uncertain solid transportation problems, Fuzzy sets and systems, 100, 45-57, (1998).
- [2] E. Shell, Distribution of a product by several properties, Directorate of Management Analysis, Proc. 2nd Symp. on Linear Programming, Vol. 2, pp.615-642, (1955).
- [3] A. Das, U.K. Bera, A Bi-Objective Solid Transportation Model under Uncertain Environment, Facets of Uncertainties and Applications, Vol.125, 261-275, (2015).
- [4] Baoding Liu, Theory and Practice of Uncertain Programming, 2002, China, (2007).
- [5] Md. Sharif Uddin, Musa Miah, Md. Al-Amin Khan, Ali AlArjani, Goal programming tactic for uncertain multi-objective transportation problem using fuzzy linear membership function, Alexandria Engineering Journal, 60, 2525-2533, (2021).
- [6] Haiying Guo, Xiaosheng Wang, Shaoling Zhou, International Journal of e-Navigation and Maritime Economy, 2, 1-15, (2015).
- [7] Waiel F. Abd El-Wahed, S. M. Lee, Interactive fuzzy goal programming for multi-objective transportation problems, Int. J. Manage. Sci., Omega, 34, 158-166, (2006).

YILDIZ TEKNİK UNIVERSITY, İSTANBUL
Email address: sedanurakturk98@gmail.com

Date: July, 8, 2023.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 155

**FRACTIONAL PREY-PREDATOR MODEL WITH LINEAR
FUNCTIONAL RESPONSE, PREY REFUGE, FEAR AND
CARRY-OVER EFFECT**

ERCAN BALCI

0000-0002-8530-7073

ABSTRACT

This paper presents a prey-predator model that incorporates the trait-mediated fear effect and its carry-over effect, as well as the prey defense mechanism of prey refuge. The functional response considered in the model is the Holling-I type. Additionally, to account for memory within the system, we analyze the Caputo fractional order version of the proposed model. The obtained results are also supported by numerical simulations.

REFERENCES

- [1] X. Wang, L. Zanette, X. Zou, Modelling the fear effect in predator-prey interactions, *Journal of mathematical biology*, 73(5), 1179-1204 (2016).
10.1007/s00285-016-0989-1
- [2] S.K. Sasmal, Y. Takeuchi, Modeling the Allee effects induced by cost of predation fear and its carry-over effects, *Journal of Mathematical Analysis and Applications*, 505(2), 125485. (2022).
10.1016/j.jmaa.2021.125485
- [3] Li, Hong-Li, et al., Dynamical analysis of a fractional-order predator-prey model incorporating a prey refuge, *Journal of Applied Mathematics and Computing*, 54: 435-449. (2017).
10.1007/s12190-016-1017-8

ERCIYES UNIVERSITY, DEPARTMENT OF MATHEMATICS, 38039, KAYSERİ, TURKEY
Email address, author one: ercanbalci@erciyes.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 37N25; 92B05 .

Key words and phrases. Prey-predator, Fear effect, Carry-over effect, Prey refuge, Caputo fractional.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 156

SUBPROJECTIVITY DOMAIN OF FINITELY GENERATED MODULES

A. Y. SHIBESHI AND Y. DURĞUN

0000-0001-8564-9041 and 0000-0002-1230-8964

ABSTRACT

In recent paper [3], a new approach in the study of the classical projectivity was introduced. Subprojectivity domain of module was introduced as a tool to measure the projectivity level of such a module. In this study, we investigated subprojectivity domain of finitely generated modules. Using these domains, we obtained new characterizations of well known rings, such as PP-rings and nonsingular rings. We show that the the class of finitely projective modules is the smallest possible subprojectivity domain of a finitely generated module. We referred to these finitely generated modules as fngp-indigent. We prove that every Noetherian ring has an fngp-indigent module. A ring R is semisimple Artinian if and only if there exists a finitely generated projective fngp-indigent module. We also show that a ring R over which every non-projective finitely generated module is fngp-indigent is either right FGF or right semihereditary.

REFERENCES

- [1] G. Azumaya, Finite splittness and finite projectivity, *J. Algebra*, 106, 114–134, (1987).
- [2] Y. Durğun, Rings whose modules have maximal or minimal subprojectivity domain, *J. Algebra Appl.*, 14(6), (2015).
- [3] C. Holston, S. R. López-Permouth, J. Mastromatteo, and J. E. Simental-Rodriguez, An alternative perspective on projectivity of modules, *Glasgow Math. J.*, 57(1), 83–99, (2015).
- [4] F. L. Sandomierski, Nonsingular rings, *Proc. Amer. Math. Soc.*, 19, 225–230, (1968).

(A. Y. Shibeshi) DEPARTMENT OF MATHEMATICS, ÇUKUROVA UNIVERSITY, 01330, ADANA, TURKIYE

Email address: arbsiey@gmail.com

(Y. Durğun) DEPARTMENT OF MATHEMATICS, ÇUKUROVA UNIVERSITY, 01330, ADANA, TURKIYE

Email address: ydurgun@cu.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 16D10; 16D40.

Key words and phrases. Finitely projective module, Subprojectivity domain, Fngp-indigent.

The second author was supported by the Scientific and Technological Research Council of Turkey (TUBITAK) (Project number: 122F130).

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 157-158

**EXISTENCE RESULTS FOR ANTIPERIODIC Ψ -CAPUTO
FRACTIONAL DIFFERENTIAL EQUATIONS WITH
 p -LAPLACIAN OPERATOR**

WALED BENHADDA, M. ELOMARI, A. KASSIDI, AND A. EL MFADEL

0000-0005-0401-9715, 0000-0002-9105-1123 and 0000-0002-2479-1762

ABSTRACT

In this paper we study the existence of solutions for antiperiodic nonlinear differential equations with Ψ -Caputo fractional derivative involving the p -Laplacian operator. The main results of this study are established by using topological degree methods, in particular condensing maps, together with various properties of the Ψ -Caputo fractional calculus and measures of noncompactness. Furthermore, to demonstrate the practical relevance of our theoretical results, we present a non-trivial example at the end of the paper.

REFERENCES

- [1] R. Almeida, A Caputo fractional derivative of a function with respect to another function, Commun. Nonlinear Sci. Numer. Simul, 44, 460–481(2017).
10.1016/j.cnsns.2016.09.006
- [2] A. El Mfadel, F. E. Bourhim and M. Elomari, Existence of mild solutions for semilinear Ψ -Caputo-type fractional evolution equations with nonlocal conditions in Banach spaces, Results Nonlinear Anal, 5(4), 459–472 (2022).
10.53006/rna.1121916.
- [3] A. A. Kilbas, H. M. Srivastava, J. J. Trujillo, Theory and applications of fractional differential equations (Vol. 204). Elsevier, (2006).

Date: July, 8, 2023.

2020 Mathematics Subject Classification. 34A08, 26A33 , 34K37.

Key words and phrases. Ψ -fractional integral, Ψ -Caputo fractional derivative, Topological degree methods.

(Walid Benhadda) SULTAN MOULAY SLIMANE UNIVERSITY, MATHEMATICS DEPARTMENT, 23000, BENI MELLAL, MOROCCO

Email address, Walid Benhadda: `benhadda.walid@mail.com`

(M. Elomari) SULTAN MOULAY SLIMANE UNIVERSITY, MATHEMATICS DEPARTMENT, 23000, BENI MELLAL, MOROCCO

Email address, M. Elomari: `m.elomari@usms.ma`

(A. Kassidi) SULTAN MOULAY SLIMANE UNIVERSITY, MATHEMATICS DEPARTMENT, 23000, BENI MELLAL, MOROCCO

Email address, A. Kassidi: `abdrazakassidi@usms.ma`

(A. El Mfadel) SULTAN MOULAY SLIMANE UNIVERSITY, MATHEMATICS DEPARTMENT, 23000, BENI MELLAL, MOROCCO

Email address, A. El Mfadel: `a.elmfadel@usms.ma`

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 159-160

A SOLUTION TO THE SOLID TRANSPORTATION PROBLEM USING LR FLAT NUMBERS

NURAN BUDAK AND NURAN GÜZEL

0009-0006-5658-6081 and 0000-0002-6585-7326

ABSTRACT

In real life, situations that are not completely known due to uncontrollable causes are frequently encountered. Fuzzy numbers are usually used to represent these unknown situations. In this paper, we suggested a solution to the problem of solid transportation in which supply, demand, and costs are completely unknown and LR is represented by fuzzy numbers, which we demonstrated. We have given an example to illustrate this proposed solution.

REFERENCES

- [1] F. Jimenez, J. L. Verdegay, Uncertain solid transportation problems, Fuzzy sets and systems, 100, 45-57, (1998).
- [2] E. Shell, Distribution of a product by several properties, Directorate of Management Analysis, Proc. 2nd Symp. on Linear Programming, Vol. 2, pp.615-642, (1955).
- [3] N. Güzel, S. Alp, E. Gecici, Solving Solid Transportation Problems Under Uncertain Environment Using Goal Programming, Journal of Industrial Engineering, 33(1), 130-144, (2022).
- [4] S. Liu, Fuzzy total transportation cost measures for fuzzy solid transportation problem, Applied mathematics and computation, 174, 927-941, (2006).
- [5] F. Torunbalcı Aydın, C. Guler, M. Sivri, A Solution Proposal For Interval Solid Transportation Problem, Journal of Engineering and Natural Sciences, 2006/3.
- [6] A. Ebrahimnejad, New method for solving Fuzzy transportation problems with LR flat fuzzy numbers, Information Sciences, 357, 108-124, (2016).
- [7] A. Kumar, A. Kaur, Application of classical transportation methods to find the fuzzy optimal solution of fuzzy transportation problems, Fuzzy Information and Engineering, 3, 81-99, (2011).
- [8] A. Kumar, A. Kaur, Application of Classical Transportation Methods for Solving Fuzzy Transportation Problems, Journal of Transportation Systems Engineering and Information Technology, vol. 11, number 5, Sayfa 68-80, October, (2011).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 90C08; 90C70.

Key words and phrases. Fuzzy Solid Transportation Problem, LR Flat Fuzzy Number, Fuzzy Membership Function, α -cut.

(Nuran BUDAK) YILDIZ TECHNICAL UNIVERSITY, MATHEMATICAL DEPARTMENT, 34210 ,
İSTANBUL, TURKEY
Email address: nuranbudak98@gmail.com

(Nuran GÜZEL) YILDIZ TECHNICAL UNIVERSITY, MATHEMATICAL DEPARTMENT, 34210 , İSTANBUL,
TURKEY
Email address: nguzel@yildiz.edu.tr

UNCORRECTED

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 161-162

**THE COMPARISON BETWEEN EFFECTS OF
HETEROGENEOUS AND HOMOGENEOUS DOUBLE LAYERED
COMPRESSIBLE ELASTIC MEDIA ON DARK SOLITARY SH
WAVES**

EKİN DELİKTAŞ ÖZDEMİR

0000-0001-7890-6521

ABSTRACT

The comparative studies are carried out between the effects of following double layered models on nonlinear evolution of dark solitary shear horizontal (SH) waves: (i) a heterogeneous top layer overlying a heterogeneous bottom layer, (ii) a heterogeneous top layer overlying a homogeneous bottom layer, (iii) a homogeneous top layer overlying a heterogeneous bottom layer, (iv) a homogeneous top layer overlying a homogeneous bottom layer. Both layers are assumed to be isotropic, compressible elastic and heterogeneities of the layers are represented by different exponential functions of the depth. Moreover $c_1\sqrt{1 + \alpha_1^2/4k^2} < c < c_2\sqrt{1 + \alpha_2^2/4k^2}$ is chosen where c_1, c_2 are linear shear wave velocities, α_1, α_2 are linear heterogeneity parameters of the top and bottom layers, respectively, k refers the wave number and c is the phase velocity of waves. A non-linear Schrodinger equation is obtained for the non-linear modulation of SH waves via a perturbation method. In the case the top layer is thinner than the bottom layer, the effects of the heterogeneity of the two-layers on both nonlinear evolution of dark solitary surface SH waves and variation of the wave profiles are compared.

REFERENCES

- [1] E. Deliktas-Ozdemir, S. Ahmetolan, D. Tuna, Existence of solitary SH waves in a heterogeneous elastic two-layered plate, *Z. Angew. Math. Phys.*, Vol. 73, pp. 220 (2022).
- [2] S. Ahmetolan, A. Peker-Dobie, A. Demirci, On the propagation of nonlinear SH waves in a two-layered compressible elastic medium, *Z. Angew. Math. Phys.*, Vol.70, N. 5, pp. 138 (2019).
- [3] S. Ahmetolan, M. Teymur, Non-linear modulation of SH waves in a two-layered plate and formation of surface SH waves, *Int. J. Non Linear Mech.*, Vol. 38, pp. 1237–1250 (2003).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 35G30, 35Q55, 74B20, 74E05.

Key words and phrases. Dark Solitary waves, Heterogeneous layers, Nonlinear SH waves.

PIRI REIS UNIVERSITY, DEPARTMENT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING,
FACULTY OF ENGINEERING, 34940, ISTANBUL, TURKEY
Email address: edeliktas@pirireis.edu.tr

UNCORRECTED

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 163-164

ON ANALYTICAL SOLUTIONS OF SPACE-TIME FRACTIONAL VARIANT BOUSSINESQ EQUATION WITH BETA DERIVATIVE

NAGEHAN ÖZDEMİR AND AYTEN ÖZKAN

0009-0007-6900-0577 and 0000-0002-3948-1943

ABSTRACT

The extended G'/G method with beta derivative is utilized in this study to obtain analytic solutions for the time fractional Variant Boussinesq equation. This equation is transformed into another non-linear differential equation using travelling wave transformations, and the solution is found using the extended G'/G method.

REFERENCES

- [1] Ozkan, A.; Ozkan, E.M.; Yildirim, O., On Exact Solution Of Some Space-Time Fractional Differential Equations with M-truncated Derivative. *Fractal Fract.*,7(3):255, (2023).
- [2] Seadawy, A.R.; El-Rashidy, K., Traveling Wave Solutions For Some Coupled Nonlinear Evolution Equations, *Mathematical and Computer Modelling*, 57, 1371-1379, (2013).
- [3] Yao, S.W.; Zafar, A.; Urooj, A.; Tariq, B.; Shakeel, M.; Inc, M., Novel Solutions To The Coupled KdV Equations And The Coupled System of Variant Boussinesq Equations, *Result in Physics*, 45, (2023).
- [4] Yusuf, A.; Inc, M.; Aliyu, A.I.; Baleanu, D., Optical Solutions Possesing Beta Derivative of the Chen-Lee-Liu Equation in Optical Fibers, *Frontiers in Physics*, Vol. , 34, (2019).
- [5] Zafar, A.; Inc, M.; Shakoor, F.; Ishaq, M., Investigation For Solutions With Some Coupled Equations, *Optical and Quantum Electronics*, 54, 243, (2022).
- [6] Zayed, E.M.E.; Amer, Y.A.; Shohib, R.M.A., Exact Travelling Wave Solutions For Nonlinear Fractional Partial Differential Equations Using The Improved G'/G -Expansion Method, *International Journal of Engineering and Applied Science*, Vol. 4, No. 7, (2014).
- [7] Zhu, S., The Extended G'/G Expansion Method And Travelling Wave Solutions Of Nonlinear Evolution Equations, *Mathematical and Computational Applications*, Vol. 15, No 5, 924-929, (2010).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 26A33; 35R11.

Key words and phrases. Extended G'/G Method, Beta Derivative, Analytical Solutions.

The first author was supported in part by the Research Fund of the Yildiz Technical University. Project Number: FYL-2023-5585.

(Nagehan Özdemir) YILDIZ TECHNICAL UNIVERSITY, DEPARTMENT OF MATHEMATICS, 34220 ,
ISTANBUL, TURKEY

Email address: nagehaan.ozdemirr@gmail.com

(Ayten Özkan) YILDIZ TECHNICAL UNIVERSITY, DEPARTMENT OF MATHEMATICS, 34220, IS-
TANBUL, TURKEY

Email address: uayten@yildiz.edu.tr

UNCORRECTED

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 165-166

SPACELIKE f -RECTIFYING CURVES IN MINKOWSKI SPACE

E_1^4

MEHMET AYDIN, AYŞE GÜN BOZOK AND ÖNDER KORKMAZ

ABSTRACT

In this paper, spacelike f -rectifying curves are introduced in Minkowski Space E_1^4 and using this definition some characterizations and classifications are researched in Minkowski Space E_1^4 .

REFERENCES

- [1] B.Y. Chen, When does the position vector of a space curve always lie in its rectifying plane?, Amer. Math. Monthly, 110, 147-152, (2003).
- [2] K. Ilarslan , E. Nesovic, Some characterizations of null, pseudo null and partially null rectifying curves in Minkowski space-time, Taiwanese J Math, 12(5), 1035-1044, (2008).
- [3] K. Ilarslan , E. Nesovic, On rectifying curves as centodes and extremal curves in the Minkowski 3-space. Novi Sad J Math, 37, 53-64, (2007).
- [4] T. Tunahan., On Rectifying Curves and Their Characterization in Lorentz n-Space, International Electronic Journal of Geometry, 11(1), 26-36, (2018).
- [5] Z. Iqbal, J.Sengupta, Non-null (spacelike or timelike) f -rectifying curves in the Minkowski 3-space ., Eurasian Bul. Math., 3(1), 38-55, (2020).
- [6] Z. Iqbal, J. Sengupta, Null (lightlike) f -rectifying curves in the Minkowski 3-space . Fundam. J.Math. Appl., 3(1), 8-16, (2020).
- [7] Z. Iqbal, J. Sengupta, Differential geometric aspects of lightlike f -rectifying curves in Minkowski space-time, Differential Geometry - Dynamical Systems, 22, 113-129, (2020).
- [8] Z. Iqbal , J. Sengupta, A Study on f -Rectifying Curves in Euclidean n-Space. Univ. J. Math. Appl., 4(3), 107-113, (2021).
- [9] Z. Iqbal, J. Sengupta, On f -rectifying curves in the Euclidean 4-space. Acta Universitatis Sapientiae, Mathematica., 13(1), 192-208, (2021).
- [10] E. Erdem, Some New Characterizations of f -Rectifying Curves Respect to Type-2 Quaternionic Frame in \mathbb{R}^4 , Prespacetime Journal,14(2), 344-353, (2023).
- [11] J. Walrave, Curves and Surfaces in Minkowski Space, (1995).
- [12] A.T. Ali , Onder M. Some Characterizations of Space-Like Rectifying Curves in the Minkowski Space-Time, Global Journal of Science Frontier Research Mathematics and Decision Sciences , 2(1), 57-63, (2012).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 53B30,53C40,53C50.

Key words and phrases. Rectifying curve, Minkowski space-time , Spacelike curve.

OSMANIYE KORKUT ATA UNIVERSITY, DEPARTMENT OF MATHEMATICS, 80000, OSMANIYE,
TURKEY

Email address: hulyagun@osmaniye.edu.tr

OSMANIYE KORKUT ATA UNIVERSITY, DEPARTMENT OF MATHEMATICS, 80000, OSMANIYE,
TURKEY

Email address: krkmz.1990@hotmail.com

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 167-168

**AN INNOVATIVE APPROACH FOR ENHANCING TRAFFIC
FLOW: DECENTRALIZED TRAFFIC SIGNAL SPLIT CONTROL
METHOD**

S.ERGUN

ABSTRACT

Traffic congestion poses a significant challenge in urban areas worldwide, giving rise to a range of issues including economic losses, air pollution, and an increase in traffic accidents. In response to this problem, extensive research is actively being conducted to address one of its key contributors, namely the operation of traffic signals at intersections, with the aim of mitigating congestion. In France, the flow approach to traffic signal control involves the utilization of predetermined control parameters or a centralized control system known as the traffic control system. However, the latter method, encounters certain shortcomings such as limited adaptability to expand or contract the control area and inadequate responsiveness in dynamic environments. This paper proposes a split control method for traffic signals that leverages a split model and an autonomous decentralized control method based on said model to optimize traffic flow. The split model characterizes the relationship between traffic flow and splits through the application of the split balance equation. The results obtained demonstrate the effectiveness of the proposed method in accurately controlling intersections of diverse shapes, while exhibiting a superior ability to smooth traffic flow when compared to the flow control method.

REFERENCES

- [1] Ahn, S., and Choi, J., Internet of vehicles and cost-effective traffic signal control, Sensors (Switzerland), 19(6), (2019).
- [2] Eom, M., and Kim, B. I., The traffic signal control problem for intersections: a review, In European Transport Research Review (Vol. 12, Issue 1), (2020).
- [3] Ergün, S., Dynamic Traffic Signal Split Control Method at Pedestrian Crossings. European Journal of Science and Technology, (2022).
- [4] Feng, C., and Zhu, Z., Separate dual-left turn signal optimization timing method, ICTIS 2019 - 5th International Conference on Transportation Information and Safety, (2019).
- [5] Goulet, N., and Ayalew, B., Distributed Maneuver Planning With Connected and Automated Vehicles for Boosting Traffic Efficiency, IEEE Transactions on Intelligent Transportation Systems, 23(8), (2022).

Date: July, 8, 2023.

Key words and phrases. Traffic flow optimization, Flow control method, Split control method, Traffic signals.

- [6] Jafari, S., and Savla, K., A decentralized feedback approach for flow control in highway traffic networks, *Automatica*, 146, (2022).
- [7] Ji, Z., Shen, G., Wang, J., Collotta, M., Li, Z., and Kong, X., Multi-Vehicle Trajectory Tracking towards Digital Twin Intersections for Internet of Vehicles. *Electronics*, 12(2), 275, (2023).
- [8] Kim, D., and Jeong, O., Cooperative traffic signal control with traffic flow prediction in multi-intersection, *Sensors (Switzerland)*, 20(1),(2020).
- [9] Kolat, M., Kővári, B., Bécsi, T., and Aradi, S., Multi-Agent Reinforcement Learning for Traffic Signal Control: A Cooperative Approach. *Sustainability*, 15(4), 3479, (2023).
- [10] Mohajerpoor, R., Cai, C., and Ramezani, M., Optimal Traffic Signal Control of Isolated Oversaturated Intersections Using Predicted Demand. *IEEE Transactions on Intelligent Transportation Systems*, 24(1), (2023).
- [11] Mushtaq, A., Haq, I. U., Sanyal, M. A., Khan, A., Khalil, W., and Mughal, M. A., Multi-Agent Reinforcement Learning for Traffic Flow Management of Autonomous Vehicles. *Sensors*, 23(5), 2373, (2023).
- [12] Nguyen, C. H., Wang, N. H., and Vu, H. L., A Joint Trajectory Planning and Signal Control Framework for a Network of Connected and Autonomous Vehicles. *IEEE Transactions on Intelligent Transportation Systems*, (2023).
- [13] Polak, M., Jurecki, R., and Buckner, K., Autonomous Vehicle Routing and Navigation, Mobility Simulation and Traffic Flow Prediction Tools, and Deep Learning Object Detection Technology in Smart Sustainable Urban Transport System. *Contemp. Readings L. and Soc. Just.*, 14–25, (2022).
- [14] Raftoyiannis, C. B., Anvari, B., Box, S., and Cherrett, T., Augmenting Traffic Signal Control Systems for Urban Road Networks with Connected Vehicles. *IEEE Transactions on Intelligent Transportation Systems*, 21(4), (2020).
- [15] Soon, K. L., Lim, J. M. Y., & Parthiban, R., Coordinated Traffic Light Control in Cooperative Green Vehicle Routing for Pheromone-based Multi-Agent Systems. *Applied Soft Computing Journal*, 81, (2021).
- [16] Sotoudeh, S. M., and HomChaudhuri, B., Velocity Optimization and Robust Energy Management of Connected Power-Split Hybrid Electric Vehicles, *Journal of Dynamic Systems, Measurement and Control, Transactions of the ASME*, 144(1), (2022).
- [17] Storani, F., Di Pace, R., and de Luca, S., A hybrid traffic flow model for traffic management with human-driven and connected vehicles. *Transportmetrica B*, 10(1), (2022).
- [18] Wu, X., and Wang, P., Intelligent Transportation Information Interaction Technology. In *Intelligent Road Transport Systems: An Introduction to Key Technologies* (pp. 151–192), (2022).
- [19] Xue, Y., Zhang, X., Cui, Z., Yu, B., and Gao, K., A platoon-based cooperative optimal control for connected autonomous vehicles at highway on-ramps under heavy traffic. *Transportation Research Part C: Emerging Technologies*, 150, (2023).
- [20] Yao, Q., Li, T., Yan, C., and Deng, Z., Accident responsibility identification model for Internet of Vehicles based on lightweight blockchain. *Computational Intelligence*, 39(1), 58–81, (2023).
- [21] Ye, B. L., Wu, W., and Mao, W., Distributed model predictive control method for optimal coordination of signal splits in urban traffic networks. *Asian Journal of Control*, 17(3), (2015).
- [22] Zhang, H., Lai, Y., and Chen, Y., Authentication methods for internet of vehicles based on trusted connection architecture. *Simulation Modelling Practice and Theory*, 122, 102681, (2023).

ISPARTA UNIVERSITY OF APPLIED SCIENCES, DEPARTMENT OF COMPUTER ENGINEERING, 32260, ISPARTA, TURKEY

Email address: serapbakioglu@isparta.edu.tr

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 169-170

**ADDRESSING THE CHALLENGE OF TRAFFIC CONGESTION:
AN INNOVATIVE APPROACH TO OPTIMIZE TRAFFIC
SIGNAL CONTROL FOR IMPROVED TRAFFIC FLOW**

S.ERGUN

ABSTRACT

Traffic congestion, a pressing issue causing significant economic losses and environmental pollution, demands effective solutions. Extensive investigations have been undertaken to mitigate traffic congestion by optimizing traffic signal control parameters. This research introduces a novel approach employing a dynamic offset control method, leveraging a multi-agent model for wide-area control applicable to diverse road networks. In this method, each intersection within the road network functions as an independent agent, engaging in negotiations with other agents, establishing connections, and forming a tree structure to create a dynamic offset control zone. Within this tree structure, agents execute green wave control based on traffic conditions at the boundaries. To assess the efficacy of the proposed method, evaluations are conducted using both a grid-like road network and a realistic road network constructed within a simulation environment. The results demonstrated that the method can dynamically and adaptively establish green waves aligned with traffic conditions, resulting in a remarkable enhancement of traffic flow. Mitigating the adverse effects of traffic congestion holds immense significance, and this innovative approach holds great promise in facilitating efficient traffic flow.

REFERENCES

- [1] Abdurakhmanov, R., Determination of Traffic Congestion and Delay of Traffic Flow At Controlled Intersections. *The American Journal of Engineering and Technology*, 4(10), 4-11, (2022).
- [2] Alsaawy, Y., Alkhodre, A., Abi Sen, A., Alshantqiti, A., Bhat, W. A., & Bahbouh, N. M., A comprehensive and effective framework for traffic congestion problem based on the integration of IoT and data analytics. *Applied Sciences*, 12(4), 2043, (2022).
- [3] Babaei, A., Khedmati, M., Jokar, M. R. A., & Tirkolaei, E. B., Sustainable transportation planning considering traffic congestion and uncertain conditions. *Expert Systems with Applications*, 227, 119792, (2023).
- [4] Cao, M., Li, V. O., & Shuai, Q., Book Your Green Wave: Exploiting Navigation Information for Intelligent Traffic Signal Control. *IEEE Transactions on Vehicular Technology*, 71(8), 8225-8236, (2022).

Date: July, 8, 2023.

Key words and phrases. Traffic congestion, Dynamic offset control, Multi-agent model, Green wave control, Traffic flow enhancement.

- [5] Chen, L. W., & Chang, C. C., Cooperative traffic control with green wave coordination for multiple intersections based on the internet of vehicles. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 47(7), 1321-1335, (2016).
- [6] Ji, L., & Cheng, W., Method of Bidirectional Green Wave Coordinated Control for Arterials under Asymmetric Release Mode. *Electronics*, 11(18), 2846, (2022).
- [7] Karimov, A., "Green Wave" Modulus: Creating An Artificial Intelligence-Based Adaptive Complex Of Road Network Permeability To Improve Road Traffic Safety. *International Bulletin of Engineering and Technology*, 3(3), 108-127, (2023).
- [8] Khamis, M. A., & Gomaa, W., Adaptive multi-objective reinforcement learning with hybrid exploration for traffic signal control based on cooperative multi-agent framework. *Engineering Applications of Artificial Intelligence*, 29, 134-151, (2014).
- [9] Lu, K., Jiang, S., Xia, W., Zhang, J., & He, K. Algebraic method of regional green wave coordinated control. *Journal of Intelligent Transportation Systems*, 1-19, (2022).
- [10] Lu, K., Tian, Y., Jiang, S., Lin, Y., & Zhang, W., Optimization Model of Regional Green Wave Coordination Control for the Coordinated Path Set. *IEEE Transactions on Intelligent Transportation Systems*, (2023).
- [11] Ma, C., & He, B., Green wave traffic control system optimization based on adaptive genetic-artificial fish swarm algorithm. *Neural Computing and Applications*, 31, 2073-2083, (2019).
- [12] Soori, K. L., Lim, J. M. Y., & Parthiban, R., Coordinated traffic light control in cooperative green vehicle routing for pheromone-based multi-agent systems. *Applied Soft Computing*, 81, 105486, (2019).
- [13] Tobita, K., & Nagatani, T., Green-wave control of an unbalanced two-route traffic system with signals. *Physica A: Statistical Mechanics and its Applications*, 392(21), 5422-5430, (2013).
- [14] Wang, T., Cao, J., & Hussain, A., Adaptive Traffic Signal Control for large-scale scenario with Cooperative Group-based Multi-agent reinforcement learning. *Transportation research part C: emerging technologies*, 125, 103046, (2021).
- [15] Wu, X., Deng, S., Du, X., & Ma, J., Green-wave traffic theory optimization and analysis. *World Journal of Engineering and Technology*, 2(3), 14-19, (2014).
- [16] Yang, S., Hierarchical graph multi-agent reinforcement learning for traffic signal control. *Information Sciences*, 634, 55-72, (2023).
- [17] Yang, S., & Yang, B., An inductive heterogeneous graph attention-based multi-agent deep graph infomax algorithm for adaptive traffic signal control. *Information Fusion*, 88, 249-262, (2022).
- [18] Yuan, S., Xu, S., & Zheng, S., Deep reinforcement learning based green wave speed guidance for human-driven connected vehicles at signalized intersections. In *2022 14th International Conference on Measuring Technology and Mechatronics Automation (ICMTMA)* (pp. 331-339). IEEE, (2022).
- [19] Zhu, L., Wang, J. X., Dai, S., & Wu, J. Y., A phase sequence optimization method oriented by ideal bidirectional green wave. In *Advances in Urban Construction and Management Engineering* (pp. 563-570). CRC Press, (2023).

ISPARTA UNIVERSITY OF APPLIED SCIENCES, DEPARTMENT OF COMPUTER ENGINEERING, 32260, ISPARTA, TURKEY

Email address: serapbakioglu@isparta.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 171-172

ROBUSTNESS CONTROL CIRCUIT FOR LOGIC CIRCUIT INTEGRATIONS WITH PIC AND ARDUINO MICROCONTROLLERS

MEHMET ERSİN AYTEKİN AND DÖNAY KAYAHAN

ABSTRACT

In the presented study, the robustness control of logic circuits, which is an important laboratory study in the field of electrical-electronics education, was carried out. Logic circuit studies are one of the important laboratories for Electrical-Electronics education. Because integrated circuits are in a closed package, it is difficult to determine their robustness by their external appearance. Therefore, it is necessary to develop a new approach for robustness control of logic circuits. In this study, two different electronic circuit designs were carried out using PIC16F877A microcontroller and Arduino microcontroller. By analyzing these designs in terms of performance, cost and convenience, a circuit that provides optimum performance and control of logic circuit ICs has been determined. In this study, two different electronic circuits are designed and analyzed with PIC 16F877A microcontroller and Arduino microcontroller, which perform the robustness control of logic circuit ICs.

REFERENCES

- [1] Zhao, X., Zhang, L., Shi, P., Karimi, H. R. Robust control of continuous-time systems with state-dependent uncertainties and its application to electronic circuits. *IEEE Transactions on Industrial Electronics*, 61(8), 4161-4170, (2013).
- [2] Marder, E., Goeritz, M. L., Otopalik, A. G. Robust circuit rhythms in small circuits arise from variable circuit components and mechanisms. *Current opinion in neurobiology*, 31, 156-163, (2015).
- [3] ÇINAR, S. Lojik Devre Laboratuvarları için Entegre Test Devresi Tasarımı. *Gazi Üniversitesi Fen Bilimleri Dergisi Part C: Tasarım ve Teknoloji*, 7(1), 165-174, (2019).
- [4] Pal, B., Chaudhuri, B. Robust control in power systems. Springer Science Business Media, (2006).

Date: July, 8, 2023.

Key words and phrases. PIC Microcontroller, Arduino Microcontroller, Logic ICs Test Circuit, Electronic Circuit Design.

This work is supported by TUBITAK-2209-A UNIVERSITY STUDENTS RESEARCH PROJECTS, numbered 1919B012114139.

- [5] Chen, C., Labrousse, D., Lefebvre, S., Petit, M., Pottay, C., Meinel, H. Study of short-circuit robustness of SiC MOSFETs, analysis of the failure modes and comparison with BJTs. *Microelectronics Reliability*, 55(9-10), 1708-1713, (2015).

(Mehmet Ersin AYTEKİN) TARSUS UNIVERSITY, VOCATIONAL SCHOOL OF TECHNICAL SCIENCES AT MERSIN TARSUS ORGANIZED INDUSTRIAL ZONE, 33100 AKDENİZ, MERSİN, TÜRKİYE
Email address, author one: mehmet.aytekin@tarsus.edu.tr

(Dönay KAYAHAN) TARSUS UNIVERSITY, VOCATIONAL SCHOOL OF TECHNICAL SCIENCES AT MERSIN TARSUS ORGANIZED INDUSTRIAL ZONE, 33100 AKDENİZ, MERSİN, TÜRKİYE

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 173

A DYNAMIC APPROACH TO THE EFFECT OF HARVESTING

S. IŞIK AND F. KANGALGIL

ABSTRACT

Comprehending the dynamics of the predator-prey models first modelled by Lotka [1] and Volterra [2] has a significant role in investigating multiple species interactions. Recently, many researchers have been increasingly interested in introducing the term harvesting in predator-prey models to make them more realistic [3]. One of the harvesting types suggested in the literature is constant yield harvesting, which is defined as the biomass harvested regardless of population size. In this study, different from the constant yield harvesting effect, we consider the model subject to the harvesting effect on the predator population.

By adding the harvest parameter to a predator-prey model, the considered model has been made more realistic. Then, and it has been made qualitative behavioural analysis, which includes examining the behaviour of predators when searching for and hunting their prey. In other words, the interaction of predators with their prey and the effect of predator behaviour on prey populations has been discussed. Also, numerical analysis has been used to confirm the theoretical results.

REFERENCES

- [1] A.J. Lotka, Elements of mathematical biology, Williams & Wilkins, Baltimore, (1925).
- [2] V. Volterra, Variazioni e fluttuazioni del numero di individui in specie animali conviventi, Mem. Acad. Lincei Vol.6, No.2, pp.31-113, (1926).
- [3] F. Brauer and D. A. Sanchez., Constant rate population harvesting: equilibrium and stability, Theoretical population biology, Vol.8, No.1, pp.12-30, (1975).

(S. Işık) DEPARTMENT OF MATHEMATICS AND SCIENCE EDUCATION, FACULTY OF EDUCATION, SIVAS CUMHURİYET UNIVERSITY, 58140, SIVAS, TURKEY.

Email address: skaracan@cumhuriyet.edu.tr

(F. Kangalgil) BERGAMA VOCATIONAL SCHOOL, DOKUZ EYLUL UNIVERSITY, 35700, IZMIR, TURKEY

Email address: figen.kangalgil@deu.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 37G35, 39A30, 39A28; 00A71.

Key words and phrases. Predator-prey system, Fixed point, Stability, Period-doubling bifurcation, Harvesting.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 174

SIMPLE WAYS FOR OBTAINING TRANSFORMATION MATRICES OF SERIAL MANIPULATORS

SAMET YAVUZ

0000-0003-2513-3267

ABSTRACT

In this paper, a transformation matrices module was presented to obtain overall transformation matrices in position analysis of serial manipulators for Denavit-Hartenberg Method with Mathematica Software. In addition to this module an extra Mathematica code was given which is written by ChatGPT. At the end of the study, a comparison of the two methods was made.

REFERENCES

- [1] L. W. Tsai. *Robot Analysis: The Mechanics of Serial and Parallel Manipulators*. NY, 1999, John Wiley & Sons, Inc.
- [2] Stephen Wolfram. *The Mathematica*. Cambridge: Cambridge university press, 1999.
- [3] ChatGPT. OpenAI. <https://openai.com/chat-gpt/> (2021).

¹UNIVERSITY OF TURKISH AERONAUTICAL ASSOCIATION, PROGRAM OF AIRCRAFT TECHNOLOGIES,
SELÇUK/İZMİR, TÜRKİYE
E-mail address: syavuz@thk.edu.tr

Date: July, 8, 2023.

Key words and phrases. Transformation matrices module, position analysis of serial manipulators, Denavit-Hartenberg Method, ChatGPT

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 175-176

**MEASUREMENTS AND EVALUATION OF ELECTRIC FIELD EXPOSURE
GENERATED BY MODEM IN HOME ENVIRONMENT**

MUSTAFA MUTLU

0000-0001-6756-066

ABSTRACT

In the home environment, we have the opportunity to access the Internet, both with computers and mobile phones, thanks to the possibilities offered by the modem. Therefore, in this study, Spectran HF-60105 device was used to determine the electromagnetic field exposure values due to these modems and to find out where these values correspond to the limit values determined by the competent committees. The device is set to save 4236 power values in its memory in a 24-hour period. The Omnilog 90200 antenna (probe), which is in the working band (750-2500MHz), is attached to the device, especially when measuring the electromagnetic field values originating from GSM. The recorded power values were converted into electric field values and the variation of both power and electric field with the number of measurements was plotted using MATLAB. The curve that gives the smallest error in the MATLAB environment was fitted to the change of the electric field values, and the two of them were plotted on the same plane depending on the number of measurements, and the equation, coefficients and statistical values of the curve were obtained. In addition, the intensity and cumulative functions of the electric field values are plotted. The electric field values recorded during the measurement are 61 V/m 25 times the limit value determined by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) for an environment, and 45.75 V/m determined by the Information and Communications Technologies Authority (ICTA), the limit value has been exceeded 66 times.

Date: July, 8, 2023.

Key words and phrases. Icnirp, Icta, Spectran HF 60105, Modem, Omnilog 90200

REFERENCES

- [1] G. Sarmaşık, R. Durusoy, A. Özkurt, Damages of electromagnetic fields we are exposed to in computer laboratories and solutions, XIV. Academic informatics conference papers 1-3 February, Sivas University, (2012).
- [2] B. Korunur Engiz, Ç. Kurnaz, Measurement and evaluation of electric field strength in Samsun city center, International journal of applied mathematics, Electronics and computer, (2016).
- [3] B. K. Gül, Ç. Kurnaz, B. Korunur Engiz, Measurement and evaluation of electromagnetic pollution in Ondokuz mayıs university Kurupelit campus in Samsun, International journal of advances in electronics engineering, (2016).
- [4] Ç. Kurnaz, An Empirical modeling of electromagnetic pollution on a university campus (First Press), ACES Express journal, (2016).
- [5] B. Korunur Engiz, Ç. Kurnaz, Long term electromagnetic field measurement and assessment for a shopping mall, Radiation protection dosimetry, (2017).
- [6] Ç. Kurnaz, B. Korunur Engiz, U. Köse, An empirical study: the impact of the number of users on electric field strength of wireless communications, Radiation protection dosimetry, (2018).
- [7] M. Mutlu, M. Kaya, Low and high frequency exposure electric field measurement in Ordu university main campus, 2nd International technological sciences and design symposium 2-5 June, Giresun/TURKIYE, (2022).
- [8] B.Y. Atikın, M.D. İlgin, S. Akşit, Domestic electromagnetic field exposure in infants living in a city center in Turkey, Balıkesir 13-21 October, (2018).
- [9] L. Seyfi, B. Akbal, Evaluation of magnetic field measurements made near some high voltage line and transformer buildings in Konya, 2nd International symposium on innovative approaches in scientific studies november 30–december 2, Samsun, Turkey, (2018).
- [10] M. Mutlu, Ç. Kurnaz, Evaluation of the electromagnetic field levels in Ordu city center for the selected base stations' coverage areas, 1. International technological design symposium. 27-29 June, page:657-665, Giresun/Turkey, (2018).
- [11] Ç. Kurnaz, M. Mutlu, Comprehensive radiofrequency electromagnetic field measurements and assessments: a city center example, Environ monit assess 192. 334. <https://doi.org/10.1007/s10661-020-08312-3>, (2020).
- [12] M. Cansız, Making a map of electromagnetic pollution with the Drive test method and evaluating the measurement results, Diyarbakır, (2012).
- [13] B. Korunur Engiz, Electric field levels and evaluation in terms of public health: Samsun city center example, Turkish journal of public health, 16 (2) 146, research paper (2018).
- [14] International commission on non-ionizing radiation protection, exposure to static and low frequency electromagnetic fields, Biological effects and health consequences (0 Hz-100 kHz), International commission on non-ionizing radiation protection, Munich, Germany, 13, (2003).

ORDU UNIVERSITY VOCATIONAL SCHOOL OF TECHNICAL SCIENCES

E-mail address: mustafamutlu1071@gmail.com/mustafamutlu@odu.edu.tr/rhetoric_68@hotmail.com

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 177

AN ENCODING -DECODING ALGORITHM BASED ON NARAYANA NUMBERS

ENGİN ESER, BAHAR KULOĞLU and ENGİN ÖZKAN

0000-0001-5965-4162, 0000-0001-7024-8270 and 0000-0002-4188-7248

ABSTRACT

In this study we present an encoding/decoding algorithm using Narayana numbers. We use the Narayana Q -matrices applying them into matrices which are blocks. By using this method, we get different keys and messages. This process aims to not only increase the reliability of information security technology, but also to provide the ability to verify information at a high rate.

REFERENCES

- [1] Allouche, J. P., & Johnson, T. Narayana's cows and delayed morphisms. In *Journées d'Informatique Musicale* (1996, May).
- [2] Bala R., & Mishra, Y. Narayan Matrix Sequence In *Proceedings of the Jangjeon Mathematical Society* (Vol. 25, No. 4, pp. 427-434) (2022).
- [3] Balakrishnan, B. J., Thirusangu, K., Murali, B. J., & Venkateswara Rao, J. Computation of Narayana Prime Cordial Labeling of Book Graphs. In *Applied Mathematics and Scientific Computing: International Conference on Advances in Mathematical Sciences, Vellore, India, December 2017-Volume II* (pp. 547-553). Springer International Publishing (2019).
- [4] Dinkaya, O., Avaroğlu, E., Menken, H., & Emsal, A. A New Encryption Algorithm Based on Fibonacci Polynomials and Matrices. *Traitement du Signal*, 39(5), 1453, (2022).
- [5] Lin, X. On the Recurrence Properties of Narayana's Cows Sequence. *Symmetry*, 13(1), 149, (2021).
- [6] Prasad, B. Coding theory on Lucas p numbers. *Discrete Mathematics, Algorithms and Applications*, 8(04), 1650074, (2016).
- [7] Shtayat, J., & Al-Kateeb, A. An Encoding-Decoding algorithm based on Padovan numbers. *arXiv preprint arXiv:1907.02007*, (2019).
- [8] Uçar, S., Taş, N., & Özgür, N. Y. A new application to coding theory via Fibonacci and Lucas numbers. *Mathematical Sciences and Applications E-Notes*, 7(1), 62-70, (2019).

DEPARTMENT OF MATHEMATICS, GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES, ERZINCAN BINALI YILDIRIM UNIVERSITY, YALNIZBAĞ CAMPUS, 24100, ERZINCAN, TÜRKİYE.

E-mail address: engineser1978@gmail.com

DEPARTMENT OF MATHEMATICS, GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES, ERZINCAN BINALI YILDIRIM UNIVERSITY, YALNIZBAĞ CAMPUS, 24100, ERZINCAN, TÜRKİYE.

E-mail address: bahar_kuloglu@hotmail.com

DEPARTMENT OF MATHEMATICS, FACULTY OF ARTS AND SCIENCES, ERZINCAN BINALI YILDIRIM UNIVERSITY, YALNIZBAĞ CAMPUS, 24100, ERZINCAN, TÜRKİYE.

E-mail address: ozkan@erzincan.edu.tr

Date: July, 8, 2023.

Key words and phrases. Coding\Decoding algorithm; matrix; Narayana sequence.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 178-179

APPLYING THE ARTIFICIAL BEE COLONY ALGORITHM: ENHANCING THE EFFICIENCY OF A HYDROGEN-BASED HYBRID RENEWABLE ENERGY SYSTEM

M. Aykut Fatih GÜVEN

0000-0002-1071-9700

ABSTRACT

Hydrogen, as a clean energy resource, has the potential to alleviate impending energy shortages and environmental issues. Owing to its plentiful renewable energy resources, Turkey is advantageously positioned to fulfill its electricity requirements. In rural locations where the energy grid is either unavailable or excessively costly, Hybrid Energy Systems (HRES) integrating multiple energy sources are employed. While HRES offer an economical solution custom-fit to distinct power needs and techno-economic circumstances, the aspects of their management, sizing, and component selection present notable difficulties. This study aims to develop, simulate, and evaluate a hybrid system composed of wind, solar, biomass gasifier, and fuel cell components. It also addresses optimization algorithms related to the management of energy flow and optimal sizing of renewable energy sources. In HRES, the surplus energy undergoes conversion into hydrogen, which is then stored and harnessed in fuel cells during instances of overproduction. The primary objective in the optimization process is to minimize the Annual Total Cost (ACS). The decision variables include the power output of solar panels and wind turbines, as well as the quantity of hydrogen tanks. A hybrid optimization method, based on the Artificial Bee Colony (ABC) algorithm, is implemented to determine the optimal dimensions of the HRES components. Consumption and weather data from 2022 are employed to design a hybrid system capable of fulfilling all energy demands at the lowest possible cost. Simulations suggest that the proposed off-grid hybrid energy system is the most cost-effective choice for the selected location. The ABC algorithm identifies the optimal system configuration, which incorporates a 358.08 kW wind turbine, a 2551.69 kW solar panel, and 636 hydrogen storage tanks. The system's annual total cost is $\$3.1189 \times 10^6$, its net present cost is also $\$3.1189 \times 10^6$, and its levelized cost of energy is 1.2300 $\$/\text{kWh}$. The energy produced by the system is entirely renewable, with 53.53% from solar, 0.57% from wind, 12.23% from fuel cells, and 33.67% from a biomass generator. The optimization algorithm was implemented using the MATLAB 2022b simulation software.

Date: July, 8, 2023.

Key words and phrases. Artificial Bee Colony Optimization Algorithm, Metaheuristic Optimization Algorithm Techniques, Hydrogen, Fuelcell, Electrolyzer, Energy Management.

REFERENCES

- [1] M. Ball, M. Wietschel, The future of hydrogen -opportunities and challenges, *Int. J. Hydrogen Energy*, 34, 615–627, (2009).
- [2] R. Dufo-López, J.L. Bernal-Agustín, J. Contreras, Optimization of control strategies for stand-alone renewable energy systems with hydrogen storage, *Renew. Energy*, 32,1102–1126, (2007).
- [3] M. Urf, F. Shaikh, L. Kumar, ScienceDirect Comparative techno-economic analysis of various stand-alone and grid connected (solar / wind / fuel cell) renewable energy systems, (2023).
- [4] M. Żołądek, R. Figaj, A. Kafetzis, K. Panopoulos, Energy-economic assessment of self-sufficient microgrid based on wind turbine, photovoltaic field, wood gasifier, battery, and hydrogen energy storage, *Int. J. Hydrogen Energy*, (2023).
- [5] A. Zahedi, H.A.Z. AL-bonsrulah, M. Tajavoghri, Conceptual design and simulation of a stand-alone Wind/PEM fuel Cell/Hydrogen storage energy system for off-grid regions, a case study in Kuhin, Iran, *Sustain. Energy Technol. Assessments*, 57, (2023).
- [6] D. Karaboga, B. Basturk, Artificial Bee Colony (ABC) optimization algorithm for solving constrained optimization problems, *Lect. Notes Comput. Sci. (Including Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinformatics)*. 4529, LNAI 789–798, (2007).
- [7] K. Kayguzuz, Energy and environmental issues relating to greenhouse gas emissions for sustainable development in Turkey, *Renew. Sustain. Energy Rev.*, 13, 253–270, (2009).
- [8] A. Fatih Güven, N. Yörükeren, M.M. Samy, Design optimization of a stand-alone green energy system of university campus based on Jaya-Harmony Search and Ant Colony Optimization algorithms approaches, *Energy*, 253, (2022).
- [9] A. Fatih Güven, M. Mahmoud Samy, Performance analysis of autonomous green energy system based on multi and hybrid metaheuristic optimization approaches, *Energy Convers. Manag.*, 269, (2022).
- [10] S. Najari, G. Gróf, S. Saeidi, F. Gallucci, Modeling and optimization of hydrogenation of CO₂: Estimation of kinetic parameters via Artificial Bee Colony (ABC) and Differential Evolution (DE) algorithms, *Int. J. Hydrogen Energy*, 44, (2019).
- [11] F. Zhong, H. Li, S. Zhong, A modified ABC algorithm based on improved-global-best-guided approach and adaptive-limit strategy for global optimization, *Appl. Soft Comput. J.*, 46, (2016).

DEPARTMENT OF ENERGY SYSTEMS ENGINEERING, YALOVA UNIVERSITY, YALOVA, TURKEY
E-mail address: afatih.guven@yalova.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 180

**INTERACTION BETWEEN RET PROTEIN KINASE AND CURCUMIN AND
RESVERATROL: A MOLECULAR DOCKING PERSPECTIVE**

DENİZ KARATAŞ

0000-0002-8176-4883

ABSTRACT

Medullary thyroid carcinoma (MTC) is a neuroendocrine tumor derived from the C cells of the thyroid gland and accounts for approximately 5% of all thyroid carcinomas [1]. A significant number of MTCs have an up-regulated RET tyrosine kinase activity. Cabozantinib have been used against medullary thyroid cancer, however, the mutant variants of RET are known to be resistant to cabozantinib. In this study, using AutoDock tools [2] and Vina [3], the interactions of curcumin and resveratrol with both wild type and mutant variants of RET protein kinase were evaluated via molecular docking. V804M and V804L mutant variants were assessed in this study. The binding free energy between cabozantinib (reference drug) and wild type RET was found to be -10.3 kcal/mol. However, the binding energy between cabozantinib and V804L and V804M RET variants were computed to be -10.3 and -9.5 kcal/mol. Nevertheless, the binding energies between curcumin and RET variants were shown to be -8.3, -8.2 and -8.1 kcal/mol for wild type, V804L and V804M variants, respectively. In the meantime the binding energy between resveratrol and RET variants were found to be -8.7, -8.4 and -8.2 kcal/mol for wild type, V804L and V804M variants, respectively. These data suggest good binding affinity of curcumin and resveratrol to RET variants. In conclusion, curcumin and resveratrol could be good candidates in the management of medullary thyroid carcinoma and other cancer types related to RET protein.

REFERENCES

- [1] Master, S.R. and B.J. Burns. *Cancer, Medullary Thyroid*. 2019.
- [2] Morris, G.M., et al., *AutoDock4 and AutoDockTools4: Automated docking with selective receptor flexibility*. J Comput Chem, **30**(16): p. 2785-91, (2009).
- [3] Eberhardt, J., et al., *AutoDock Vina 1.2.0: New Docking Methods, Expanded Force Field, and Python Bindings*. J Chem Inf Model. **61**(8): p. 3891-3898,(2021).

MANISA CELAL BAYAR UNIVERSITY, BIOENGINEERING DEPARTMENT, YUNUSEMRE, MANISA, 45140, TURKEY
E-mail address: deniz.karatas@cbu.edu.tr

Date: July, 8, 2023.

Key words and phrases. MTC, Molecular docking, curcumin, resveratrol.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 181-182

**A LITERATURE SURVEY BASED ON THE TABU SEARCH HEURISTIC METHOD FOR
THE SOLUTION OF THE MULTIDIMENSIONAL AND MULTI-OBJECTIVE
KNAPSACK PROBLEM AND VARIATIONS**

G. G. GÜNER

0000-0001-9513-3401

ABSTRACT

The Knapsack Problem is a classic operations research problem, and it is mathematically in the class of combinatorial optimization. It is among the most famous NP-hard problems in terms of solution algorithm. The Knapsack Problem can be applied in different real-life decision-making processes. For example, choosing an investment/portfolio and asset selection for the asset-backed securitization are some of them. This problem with different real-life application areas can turn into different types of problems (i.e., bounded knapsack problem) according to different limitation situations. Different heuristic solution approaches can be used to solve the problem. Tabu Search stands out as one of these solution approaches. Tabu Search is a heuristic method to guide local search methods and to find the best or near-best solutions for combinatorial optimization problems to get rid of local best solutions. Tabu Search has been successfully applied to many areas such as transportation, facility layout, expert systems, neural networks, telecommunications, and scheduling. Tabu Search has basic components called initial solution, mechanism of action, candidate list strategies, memory, tabu breaking criteria, and ending conditions. In this study, a literature search based on the Tabu Search heuristic method was conducted to solve the knapsack problem and its variations. The studies in the literature, especially in recent years, have been examined and compared in detail. The proposed study is intended to guide decision-makers about the application methodologies of the Tabu Search heuristic method for solving the knapsack problem and its variations.

Date: July, 8, 2023.

2000 Mathematics Subject Classification. Primary 90C27; Secondary 68T20.

Key words and phrases. Knapsack problem, Combinatorial optimization, Tabu search.

REFERENCES

- [1] X.Lai, J-K Hao, D. Yue, Two-stage solution-based tabu search for the multidemand multidimensional knapsack problem, *European Journal of Operational Research*, Vol.274,pp.35-48 (2019).
- [2] B. Alidaee, V. P. Ramalingam, H. Wang, B. Kethley, Computational experience of critical event tabu search for the general integer multidimensional knapsack problem, *Ann Oper Res*, Vol.269, pp.3-19 (2018).
- [3] J. Qin, X. Xu, Q. Wu, T. C. E. Cheng, Hybridization of tabu search with feasible and infeasible local searches for the quadratic multiple knapsack problem, *Computers and Operations Research*, Vol.66, pp.199-214 (2016).
- [4] C. S. Hiremath, R. R. Hill, First-level tabu search approach for solving the multiple-choice multidimensional knapsack problem, *Int. J. Metaheuristics*, Vol.2, N. 2, pp. 177-199 (2013).
- [5] V.C. Lia, G. L. Curry, Solving multidimensional knapsack problems with generalized upper bound constraints using critical event tabu search, *Computers and Operations Research*, Vol.32, pp.825-848 (2005).
- [6] X. Gandibleux, A. Freville, Tabu search based procedure for solving the 0-1 multiobjective knapsack problem: the two objectives case, *Journal of Heuristics*, Vol.6, pp.361-383 (2000).

UNIVERSITY OF TURKISH AERONAUTICAL ASSOCIATION, DEPARTMENT OF INDUSTRIAL ENGINEERING,
06790, ANKARA, TURKEY
E-mail address: egundur@thk.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 183-184

NUMERICAL INVESTIGATION OF THE THERMAL PERFORMANCE OF A LIQUID-COOLED BATTERY PACK

SONER BIRINCI, MEHMET SAĞLAM, BUĞRA SARPER, M. YUSUF YAZICI and ORHAN AYDIN

0000-0002-6668-5490, 0000-0002-987-8675, 0000-0001-7554-6575, 0000-0002-1076-9265 and 0000-0002-2492-8212

ABSTRACT

In this study, liquid-cooled active battery thermal management system (BTMS) with cold plate is investigated numerically for 18650 cylindrical li-ion battery pack arranged in a 2x6 layout. For this purpose, three different configurations of the BTMS and different volume flow rates (0-1 l/min) are studied under 2C discharge rate. The first configuration (Model I) refers to double sided cooling, the second configuration (Model II) refers to the single sided cooling, and third configuration (Model III) refers to both single sided cooling and aluminum block cooling. Numerical studies are conducted with ANSYS Fluent, and the highest temperature in the battery pack, the highest temperature difference between the cells, the cooling efficiency, pressure drop in cold plate and the energy density of the battery pack are compared for different configurations. The results show that the highest temperature in battery pack and the highest temperature difference between the cells decrease with the increase in flow rate. However, after 0.5 l/min, further increase in flow rate has no obvious effect on cooling performance. Moreover, the pressure drop in the cold plate increases with the increasing flow rate. Therefore, 0.25-0.5 l/min are considered as the optimum flow rates among these three configurations. Comparing three configurations, Model III is the optimum configuration, especially considering the highest temperature in battery pack and the highest temperature difference between the cells.

Date: July, 8, 2023.

Key words and phrases. Li-ion battery, CFD, Thermal behavior, Liquid-cooled, Battery thermal management systems (BTMS).

REFERENCES

- [1] İ. Dinçer, H. S. Hamut, N. Javani, Thermal Management of Electric Vehicle Battery Systems. In Thermal Management of Electric Vehicle Battery Systems. John Wiley & Sons, Ltd, (2017).
- [2] British Petroleum. Statistical Review of World Energy. 2020.
<https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2020-full-report.pdf>
- [3] H. Liu, Z. Wei, W. He, J. Zhao, Thermal issues about Li-ion batteries and recent progress in battery thermal management systems: A review, *Energy Conversion and Management*, 150, 304-330, (2017).
- [4] Q. Wang, P. Ping, X. Zhao, G. Chu, J. Sun, L. Chen, Thermal runaway caused fire and explosion of lithium-ion battery, *Journal of Power Sources*, 208, 210-224, (2012).
- [5] A. Pesaran, G. K. Nrel, Addressing the Impact of Temperature Extremes on Large Format Li-Ion Batteries for Vehicle Applications (Presentation), NREL (National Renewable Energy Laboratory), 30Th International Battery Seminar, (2013).
- [6] ANSYS CFX-Solver Theory Guide, ANSYS, Inc., Canonsburg PA, (2021).
- [7] E. Gümüşsu, Ö. Erci, M. Kılıksal, 3-D CFD modeling and experimental testing of thermal behavior of a Li-Ion battery, *Applied Thermal Engineering*, 120, 484-495, (2017).
- [8] D. Bernardi, A general energy balance for battery systems, *J Electrochem Soc*;132:5, (1985)

DEPARTMENT OF MECHANICAL ENGINEERING, KARADENİZ TECHNICAL UNIVERSITY, TRABZON, TURKEY
E-mail address: sonerbirinci@ktu.edu.tr

DEPARTMENT OF MECHANICAL ENGINEERING, KARADENİZ TECHNICAL UNIVERSITY, TRABZON, TURKEY
E-mail address: mehmetşaglam@ktu.edu.tr

DEPARTMENT OF MECHANICAL ENGINEERING, TARSUS UNIVERSITY, MERSİN, TURKEY
E-mail address: bugrasarper@tarsus.edu.tr

DEPARTMENT OF MECHANICAL ENGINEERING, SAMSUN UNIVERSITY, SAMSUN/TURKEY
E-mail address: yazicim@gmail.com

DEPARTMENT OF MECHANICAL ENGINEERING, KARADENİZ TECHNICAL UNIVERSITY, TRABZON, TURKEY
E-mail address: oaydin@ktu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 185-186

CORPORATE CARBON FOOTPRINT CALCULATION AND EVALUATION OF MERSİN UNIVERSITY ÇİFTLİKKÖY CAMPUS

HASRETTİN KAYAKAYA¹, YASİN ÖZAY² and NADİR DİZGE¹

0000-0002-6154-1137, 0000-0001-5419-6115 and 0000-0002-7805-9315

ABSTRACT

The increasing greenhouse gases present in the troposphere layer, which is located on average eleven kilometers above the atmosphere in our world, and global warming threaten the continuity of the entire ecosystem. In particular, the increase in the use of fossil fuels, the increase in the number of population every day, industrialization and deforestation are all activities that increase global warming by increasing the amount of greenhouse gas emissions. Natural disasters caused by global warming and climate change complicate the life activities of all living things. Recently, increasing to prevent changes in the climate system and thus, if it is to continue in the future the increase of natural disasters, drought, seasonal changes, change in extreme temperature difference Day and night on earth as the change in the amount of naturally occurring gases vital to live with the results, it is envisaged that this will not be a world for 50 years. On an international scale, which is one of the most important environmental problems-climate change, due to all organisms affect all national and international institutions and organizations should do their part. Developed and developing countries in order to prevent the creation of a new energy policy, climate change, carbon emissions and thus the necessity for the provision of a sustainable environment by maintaining a minimum level of the United Nations and is important for studies is located. In order to obtain results in the studies carried out, the expression of carbon footprint appears. Carbon footprint is the indication of greenhouse gas emissions released into the atmosphere as a result of activities in terms of carbon dioxide. Mersin University Çiftlikköy Campus has a very important position in the greenhouse gas emission emitted in Mersin province in terms of the area it covers in Mersin province and the excess of the human population. For this reason, in this study, Mersin University Çiftlikköy Campus Corporate Carbon Footprint Calculation was performed. In the calculation, the amount of carbon dioxide released by using the natural gas consumption data of the campus related to heating for the year 2022, electricity consumption, vehicles belonging to the university and fuel consumption of vehicles entering the campus were calculated. The calculations also revealed a total of 23,614 tons of CO₂e, which accounts for 73.7% of greenhouse gas emissions in Scope 3, including other indirect emissions related to campus entry, academics, guest vehicle fuels, and minibus-bus. This quantity represents the amount of carbon dioxide emitted from fuel. The annual fuel consumption of vehicles owned by the Rectorate, as well as the natural gas consumption for heating, are classified as direct emissions in Scope 1. They have been calculated to be 1,132 tons of CO₂e. Additionally, Scope 2 indirect greenhouse gas emissions, resulting from electricity consumption, have been estimated to be 5,060 tons of CO₂e.

Date: July, 8, 2023.

Key words and phrases. Global Warming, Greenhouse Gas Emissions, Carbon Footprint, Climate Change, Mersin University.

REFERENCES

- [1] Aksay S. C., Ketenoglu O., Kurt L., "Global Warming and Climate Change," Selçuk University Journal of Science, Number 25, 29-41, (2005).
- [2] Dağlıoğlu T., Carbon Footprint Analysis of Ege University Within the Scope of Environmental Sustainability, Kommagene Biology Journal (2021).
- [3] Erdoğan, S. Energy, Environment, and Greenhouse Gases. Çankırı Karatekin University Journal of Faculty of Economics and Administrative Sciences, 10(1), 277-305. DOI: 10.18044/ckuiibfd.670673, (2020).
- [4] Koç E., Kaya K. "Energy Resources - Renewable Energy Status," Engineer and Machinery, volume 56, issue 668, pp. 36-47, (2015).
- [5] Koç A., Yağlı H., Koç Y., Uğurlu İ., General Evaluation of Energy Outlook in the World and Turkey, Engineer and Machinery, volume 59, issue 692, pp. 36-54, Review Article, (2018).
- [6] Küçükkalay M., Analysis of the Industrial Revolution and Its Economic Consequences, Süleyman Demirel University, Journal of Faculty of Economic and Administrative Sciences, pp. 51-68, (1997).
- [7] Özsoy E. C., Low Carbon Economy and Turkey's Carbon Footprint, Hak-İş International Labor and Society Journal, © Volume: 4, Year: 4, Issue: 6, ISSN: 2147-3668, (2015/2).
- [8] Turan R. B., Corporate Carbon Footprint Calculation of Bursa Osmangazi Municipality and Climate Change Adaptation Studies, Climate Change and Environment, 4(1): 17-24, (2019).
- [9] Üreten, A., Özden, S. How to Calculate Corporate Carbon Footprint: A Theoretical Study. Anatolian Journal of Forest Research 4(2): 98-108, (2018).

¹ MERSIN UNIVERSITY, DEPARTMENT OF ENVIRONMENTAL ENGINEERING, 33343 MERSIN, TURKEY
E-mail address: hasret@lotuscevre.com.tr

² TARSUS UNIVERSITY, DEPARTMENT OF ENVIRONMENTAL PROTECTION TECHNOLOGIES, 33400 MERSIN, TURKEY
E-mail address: yasinozay@tarsus.edu.tr

¹ MERSIN UNIVERSITY, DEPARTMENT OF ENVIRONMENTAL ENGINEERING, 33343 MERSIN, TURKEY
E-mail address: nadirdizge@gmail.com

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 187-188

PROCESS IMPROVEMENT WITH VALUE FLOW MAPPING METHOD FOR LOW DENSITY POLYETHYLENE RECYCLING PROCESSES

EMRE CAN TEMİZ^{1*} and EMEL YONTAR¹

¹0000-0003-2993-4528 and 0000-0001-7800-2960

ABSTRACT

In today's competitive conditions, businesses have to be customer-oriented in order to survive. Competitive conditions require being dynamic while being open to innovation, change and continuous improvement. Customer orientation, on the other hand, aims to meet customer needs and even go beyond their expectations. In this direction, businesses are trying to shape production according to production systems that will keep up with competition conditions. Lean manufacturing systems that meet these goals are a value-oriented system that contributes to production and aims at continuous improvement. The aim of this study is to investigate the concept of value stream mapping within the scope of lean manufacturing and to evaluate the results by applying value stream mapping to low density polyethylene recycling processes. As a result of these data, it is aimed to draw the future situation map according to the result of the improvement studies planned after the current situation of the enterprise and to analyze the difference between the two maps and to make the necessary improvements with lean production techniques. Lean manufacturing techniques are frequently used by companies that want to reduce their costs and increase their quality and performance. In the application part of this study, in a business that has difficulties in preparing its orders on time, has problems such as excessive production errors and low production line efficiency, it is aimed to identify the waste sources on the way to lean production, by using the value stream mapping method, by taking into account the known or unknown wastes. With lean manufacturing techniques, it is aimed to identify where the problem is and to find possible solutions for improvement. Accordingly, the current value stream mapping study was carried out in the plastics industry that produces granule raw materials. There are sorting, crushing and washing, whisking and squeezing, extrusion and packaging activities in the process until the output of the product, whose inputs are made with raw material, labor and energy. Working 6 days a week, 3 shifts, 8 hours per shift. The weekly production amount of the company, which has a daily networking time of 22.5 hours, is observed as 37,500 kg. In the light of this basic information, value-creating and non-value-creating activities provide a map showing the steps that do not add value to the final product with the value stream mapping method, which is one of the lean manufacturing techniques. With the future situation map, scenarios are developed and improvements are determined. In this study, it contributes to the provision of necessary solutions to prevent possible errors in low density polyethylene recycling processes and to provide competitive conditions.

Date: July, 8, 2023.

Key words and phrases. Lean manufacturing, value stream mapping, low density polyethylene, process improvement

REFERENCES

- [1] Alzubi, E., Atieh, A. M., Abu Shgair, K., Damiani, J., Sunna, S., & Madi, A. Hybrid integrations of value stream mapping, theory of constraints and simulation: Application to wooden furniture industry. *Processes*, 7(11), 816, (2019).
- [2] Čiarnienė, R., & Vienažindienė, M. Lean Manufacturing: Theory and practice. *Economics and Management*, 17(2), 726-732, (2012).
- [3] Dailey, K. The Lean Manufacturing Handbook. New York: CRC Press, (2003).
- [4] Marchwinski, C., Shook, J. ve Schroeder, A. Lean Lexicon: A Graphical Glossary for Lean Thinkers. Cambridge: The Lean Enterprise Institute, (2008).
- [5] Rich, N., Bateman, N. ve Esain, A. Lean Evolution: Lessons from the Workplace. New York: Cambridge University Press, (2006).

¹TARSUS UNIVERSITY, GRADUATE SCHOOL OF EDUCATION, DEPARTMENT OF MECHANICAL ENGINEERING, TARSUS, MERSİN TÜRKİYE
E-mail address: emre_temiz@tarsus.edu.tr

¹TARSUS UNIVERSITY, FACULTY OF ENGINEERING DEPARTMENT OF INDUSTRIAL ENGINEERING, TARSUS, MERSİN, TÜRKİYE
E-mail address: ayontan@tarsus.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 189

**INVESTIGATING SOLITARY WAVE SOLUTIONS OF THE BENJAMIN-ONO
EQUATION FOR MODELLING INTERNAL WAVES
IN DEEP WATER**

GÜLSEREN KILINÇ¹, SERBAY DURAN² AND BİRGÜL BİNZET³

0000-0002-9657-2577, 0000-0002-3585-8061 and 0000-0002-2315-4921

ABSTRACT

In this study, the Benjamin-Ono equation, which is physically very important in modelling internal waves in deep water, is investigated. The Benjamin-Ono equation was introduced by Benjamin and Ono in 1967 and 1975, respectively. Travelling wave solutions are generated by selecting a suitable analytical method for the Benjamin-Ono equation. Graphs of solitary waves have been obtained by numerically describing the physical quantities in travelling wave solutions are presented and analysed. The difference of the obtained solitary wave solutions from the solutions in the literature has been emphasized and the effects of the chosen analytical method on the traveling wave solution are discussed in terms of analysis and applied mathematics.

REFERENCES

- [1] Benjamin, T. B. Internal waves of permanent form in fluids of great depth. *Journal of Fluid Mechanics*, 29(3), 559-592, (1967).
- [2] Ono, H. Algebraic solitary waves in stratified fluids. *Journal of the Physical Society of Japan*, 39(4), 1082-1091, (1975).
- [3] Duran, S., Durur, H., & Yokuş, A. Traveling wave and general form solutions for the coupled Higgs system. *Mathematical Methods in the Applied Sciences*, 46(8), 8915-8933, (2023).

DEPARTMENT OF MATHEMATICS AND SCIENCE EDUCATION, FACULTY OF EDUCATION, ADIYAMAN UNIVERSITY, ADIYAMAN, 02040, TURKEY
E-mail address: gkilinc@adiyaman.edu.tr

DEPARTMENT OF MATHEMATICS AND SCIENCE EDUCATION, FACULTY OF EDUCATION, ADIYAMAN UNIVERSITY, ADIYAMAN, 02040, TURKEY
E-mail address: sduran@adiyaman.edu.tr

DEPARTMENT OF MATHEMATICS AND SCIENCE EDUCATION, FACULTY OF EDUCATION, ADIYAMAN UNIVERSITY, ADIYAMAN, 02040, TURKEY
E-mail address: bpeker@adiyaman.edu.tr

Date: July, 8, 2023.

Key words and phrases. Benjamin-Ono equation, Analytical method, Solitary wave solution.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 190-191

A REVIEW ON LATEST DEVELOPMENTS IN ASSEMBLY AND TEMPORARY SHELTERS FOR NATURAL DISASTERS

İREM KARAKAYA, ALEV TAŞKIN

0000-0003-3176-1518, 0000-0003-1803-9408

ABSTRACT

Assembly and temporary shelter areas are spaces that allow people to stay in safe zones following a disaster. Therefore, studies related to assembly areas and temporary shelters, particularly within the framework of natural disasters, are of great importance. This article examines the efforts concerning assembly areas, temporary shelters, and evacuations during a natural disaster process. The purpose of this review is to identify challenges, provide a research gap, and propose potential research directions for the future. The motivation behind this study stems from the increasing number of natural disasters in recent years due to climate change and the need for ideas to ensure the well-being of disaster victims and regional authorities. For the first time, this study reviews the literature on assembly areas and temporary shelters regarding natural disasters over the past three years. Finally, following the analysis of the reviewed studies, some potential options for future research are suggested.

REFERENCES

- [1] S. C. Wirasinghe, H. J. Caldera, S. W. Durage, and J. Y. Ruwanpura, "Preliminary Analysis and Classification of Natural Disasters," *9th Annu. Int. Conf. Int. Inst. Infrastruct. Renew. Reconstr.*, no. February 2015, p. 11, 2013, doi: 10.13140/RG.2.1.4283.5041.
- [2] A. K. Çınar, "Analysing The Planning Criterias of Emergency Assembly Points and Temporary Shelter Areas: Case of İzmir-Karşıyaka," *J. Plan.*, vol. 28, no. 2, pp. 179-200, doi: 10.14744/planlama.2018.07088, (2018).
- [3] Y. Li, Y. Liu, and J. Jiao, "A GIS-based Suitability Analysis of Xiamen's Green Space in Park for Earthquake Disaster Prevention and Refuge," *Urban Plan. Des. Res.*, vol. 1, no. 1, pp. 1-8, [Online]. Available: www.seipub.org/updr.(2013).
- [4] D. Félix, J. M. Branco, and A. Feio, "Temporary housing after disasters: A state of the art survey," *Habitat Int.*, vol. 40, pp. 136-141, doi: 10.1016/j.habitatint.2013.03.006, (2013).
- [5] L. Gostelow, "The Sphere Project: The implications of making humanitarian principles and codes work," *Disasters*, vol. 23, no. 4, pp. 316-325, doi: 10.1111/1467-7717.00121, (1999).
- [6] D. D. Aman and G. Aytac, "Multi-criteria decision making for city-scale infrastructure of post-earthquake assembly areas: Case study of Istanbul," *Int. J. Disaster Risk Reduct.*, vol. 67, no. May 2021, p. 102668, 2022, doi: 10.1016/j.ijdr.2021.102668.
- [7] I. Sahmutoglu, A. Taskin, and E. Ayyildiz, *Assembly area risk assessment methodology for post-flood evacuation by integrated neutrosophic AHP-CODAS*, vol. 116, no. 1. Springer Netherlands, doi: 10.1007/s11069-022-05712-1, (2022).

Date: July, 8, 2023.

Key words and phrases. assembly and temporary shelter, natural disasters.

DEPARTMENT OF MANAGEMENT AND ORGANIZATION, BARTIN UNIVERSITY, BARTIN, TÜRKİYE
E-mail address: isahmutoglu@bartin.edu.tr

DEPARTMENT OF INDUSTRIAL ENGINEERING, YILDIZ TECHNICAL UNIVERSITY, ISTANBUL, TÜRKİYE
E-mail address: ataskin@ytu.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 192-193

A NEW APPROACH FOR SCORE FUNCTION ON Q-RUNG ORTHOPAIR FUZZY SETS

ALİ KÖSEOĞLU

0000-0002-2131-7141

ABSTRACT

Q-rung orthopair fuzzy sets are a generalization of intuitionistic fuzzy sets and pythagorean fuzzy sets. They are very useful tools for dealing with uncertain information. The score functions of this set play an important role in comparing such data with each other. However, current score functions have some drawbacks that lead to unreasonable and indeterminate results. In this paper, we introduce a new type of score function that fixes these defects.

REFERENCES

- [1] K. T. Atanassov, Intuitionistic Fuzzy Sets, *Fuzzy Sets and Systems*, 20(1), 87-96, (1986).
- [2] R. R. Yager, A.M. Abbasov, Pythagorean membership grades, complex numbers and decision making, *Int. J. Intell. Syst.* 28 (5), 436-452, (2013).
- [3] R. R. Yager, Generalized orthopair fuzzy sets, *IEEE Transactions on Fuzzy Systems*, 25(5), 1222-1230, (2016).
- [4] Liu, P., Wang, P., Some q-rung orthopair fuzzy aggregation operators and their applications to multiple-attribute decision making, *International Journal of Intelligent Systems*, 33(2), 259-280, (2018).
- [5] Peng, X., Dai, J., Garg, H., Exponential operation and aggregation operator for q-rung orthopair fuzzy set and their decision-making method with a new score function, *International Journal of Intelligent Systems*, 33(11), 2255-2282, (2018).
- [6] Wei, G., Wei, C., Wang, J., Gao, H., Wei, Y., Some q-rung orthopair fuzzy Maclaurin symmetric mean operators and their applications to potential evaluation of emerging technology commercialization, *International Journal of Intelligent Systems*, 34(1), 50-81, (2019).
- [7] Peng, X., Dai, J., Research on the assessment of classroom teaching quality with q-rung orthopair fuzzy information based on multiparametric similarity measure and combinative distance-based assessment, *International Journal of Intelligent Systems*, 34(7), 1588-1630, (2019).
- [8] Li, H., Yin, S., Yang, Y., Some preference relations based on q-rung orthopair fuzzy sets, *International Journal of Intelligent Systems*, 34(11), 2920-2936, (2019).
- [9] Mi, X., Li, J., Liao, H., Kazimieras Zavadskas, E., Al-Barakati, A., Barnawi, A., Herrera-Viedma, E., Hospitality brand management by a score-based q-rung ortho pair fuzzy VIKOR method integrated with the best worst method, *Economic research-Ekonomska istraživanja*, 32(1), 3266-3295, (2019).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Score function, q-rung orthopair fuzzy set, Decision making.

RECEP TAYYIP ERDOGAN UNIVERSITY, FACULTY OF ARTS AND SCIENCES, DEPARTMENT OF MATHEMATICS, RIZE,
TURKEY
E-mail address: ali.koseoglu@erdogan.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 194-195

BIOFUEL UTILIZATION IN THE AVIATION INDUSTRY

Emine K. İBRAHİMANER¹ and Özlem ATEŞ DURU²

¹0000-0001-8961-5113 and ²0000-0001-8902-8027

ABSTRACT

In this century, when we are struggling with global warming and its effects, scientists are considering many solutions, especially finding alternatives to fossil fuels. It is known that fossil fuels increase CO₂ emissions, cause greenhouse gas problems and environmental pollution. The transportation sector is considered a major polluter producing high amounts of CO₂. For example, the aviation industry produces a significant amount of greenhouse gas emissions, and it was stated in the study of ICAO in 2016 that if there is no intervention until 2050, the emissions from aviation could increase by 300-700% (ICAO Environmental Report, 2016). Since the aviation industry accounts for 2% of the total CO₂ emissions worldwide, it has been stated that international aviation organizations aim to achieve carbon neutral growth from 2020 and reduce their emissions by 50% by 2050 compared to 2005 levels (Icao Resolutions Adopted by The Assembly, 2016).

Therefore, clean and environmentally friendly renewable energy sources are evaluated to meet energy demands and provide zero or nearly zero air pollutant emissions (Qazi et al., 2019). Electric or hybrid car technologies have started to be developed and used as an alternative to fossil fuels in land transportation. Rendón et al. (2021) stated that the hybrid electric propulsion system is an evolution for small airplanes in airports with small runways in commercial applications. However, the source of electricity is another problem related to environmental issues.

Biofuel, which is an effective alternative renewable energy source, is a solid, liquid, or gaseous fuel extracted from biomass (Braun et al., 2008). Biofuel production has faced an increasing demand in recent years. About 3.4% of road transport is covered by biofuels. Most of the biofuel production belongs to Brazil. In general, Brazil is followed by the United States and then the European Union countries in biofuel production (Ho, et al., 2014). Although all-electric and hybrid-electric aircraft will transform the market in the future, noise, emissions, fuel consumption, and flight range will remain critical issues. Nevertheless, it is necessary to continue to contribute to the research on aviation biofuels used today. The utilization of biofuels in the aviation sector could have a significant effect on solving environmental problems. In this study, biofuel utilization and its effects on the aviation industry were investigated and evaluated. Figuring out the potential of biofuel as an alternative to fossil fuels in the aviation sector was also discussed in detail. The roadmap and suggestions were included to the discussion.

Date: July, 8, 2023.

Key words and phrases. aviation sector, biofuel, renewable energy

REFERENCES

- [1] Afolalu, S. A., Yusuf, O. O., Abioye, A. A., Emetere, M. E., Ongbali, S. O., & Samuel, O. D. Biofuel; A sustainable renewable source of energy-a review. In IOP Conference Series: Earth and Environmental Science (Vol. 665, No. 1, p. 012040). IOP Publishing, (2021, March).
- [2] Braun, R., Weiland, P., and Wellinger, A. Biogas from energy crop digestion. In *EA Bioenergy Task*; 37:1-20, (2008).
- [3] Hijazi, O. S., Munro, S., Zerhusen, B., Effenberger, M. Review of life cycle assessment for biogas production in Europe. *renew. Shut down Energ. Rev.* 54, 1291-1300, (2016).
- [4] Ho, D. P., Ngo, H. H., & Guo, W. A mini review of renewable sources for biofuel. *Bioresource technology*, 169, 742-749, (2014).
- [5] Qazi, A., Hussain, F., Rahim, N. A., Hirdake, G., Alghazzawi, D., Shaban, K., & Haruna, K. Towards sustainable energy: a systematic review of renewable energy sources, technologies, and public opinions. *IEEE access*, 7, 63837-63851, (2019).
- [6] Testa, R., Foderà, M. A. M., Di Trapani, A.M., Tudisca, S., Sgroi, F. Giant reed as energy crop for Southern Italy: An economic feasibility study. *renew. Shut down Energ. Rev.* 58, 558-564, (2016).
- [7] Accessed on 07.03.2023 ICAO Environmental Report 2016 <<https://www.icao.int> >
- [8] Accessed on 07.03.2023 https://www.icao.int/Meetings/a39/Documents/Resolutions/a39_res_prov_en.pdf.

¹ DEPARTMENT OF BIOTECHNOLOGY, INSTITUTE OF GRADUATE PROGRAMS, İSTANBUL NİŞANTAŞI UNIVERSITY, İSTANBUL, TURKEY

E-mail address: emine.uzun90@hotmail.com, emineuzunkahramaner@gmail.com

² DEPARTMENT OF CHEMICAL ENGINEERING, FACULTY OF ENGINEERING, BOLU ABANT İZZET BAYSAL UNIVERSITY, BOLU, TURKEY

E-mail address: ozlem.ates@nisantasi.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 196-198

INVESTIGATION OF CONVECTION HEAT TRANSFER COEFFICIENT EFFECTS ON THERMAL ENERGY STORAGE PERFORMANCE WITH PCM/GRAPHITE MATRIX

SABER M. ANCI^{1*} and MUSTAFA YUSUF YAZICI¹

ABSTRACT

PCM-based thermal energy storage systems provide an effective means of capturing, storing, and releasing thermal energy. Their high energy storage density, temperature control capabilities, and contribution to sustainable energy practices make them a promising solution for optimizing energy utilization and reducing environmental impact. However, their low thermal conductivity values significantly limit their usability. Integration of PCMs with graphite matrix can significantly improve thermal conductivity, thereby enhancing energy storage efficiency. The main focus here is to ensure the effective maintenance of thermal energy and minimize energy losses by contributing to the development of more sustainable energy storage solutions. In this work, a numerical study has been conducted to predict the effect of environmental conditions on the thermal energy storage performance of graphite matrix saturated with PCM (paraffin) for solar thermal energy and waste heat recovery, including different convection heat transfer coefficient values of 0, 5, 10, and 50 W/m²K, which refer to adiabatic, natural convection/still air, forced convection with fans (air conditioning), and windy weather, respectively. The effect of the convection heat transfer coefficient is evaluated for different bulk density values of 100 kg/m³ and 143 kg/m³. Results indicated that uniform melting behavior was observed in the PCM/graphite matrix composite due to the high porosity of graphite, which allowed a dominant conduction heat transfer mechanism, and energy storage rates climbed with the increase in bulk density. Higher heat transfer coefficient values cause a higher total melting time and lower thermal energy storage rates. The effect of the convection heat transfer coefficient on total melting time is appreciable for 50 W/m²K compared to lower h values for each bulk density. The effect of the convection heat transfer coefficient is lower for a higher bulk density of 143 kg/m³. On the other hand, the effect of bulk density on the energy storage rate is maximum 9% for lower convection heat transfer coefficients (<50 W/m²K), while the impact level of bulk density increases to 15% at 50 W/m²K.

Date: July, 8, 2023.

Key words and phrases. Thermal energy storage, melting, composite PCMs, convection heat transfer coefficient, numerical

REFERENCES

- [1] A. K. Rai, M. M. A practical approach to design and optimization of single phase liquid to liquid shell and tube heat exchanger. 1985, 429–437. (2012).
- [2] Ahmed, S. F., Rafa, N., Mehnaz, T., Ahmed, B., Islam, N., Mofijur, M., Hoang, A. T., & Shafiullah, G. M. Integration of phase change materials in improving the performance of heating, cooling, and clean energy storage systems: An overview. *Journal of Cleaner Production*, 364(March), 132639. <https://doi.org/10.1016/j.jclepro.2022.132639>, (2022).
- [3] International Energy Agency (IEA) World Energy Outlook 2022. <https://www.iea.org/reports/world-energy-outlook-2022/executive-summary>. (2022).
- [4] Li, Z., Sun, W. G., Wang, G., & Wu, Z. G. Experimental and numerical study on the effective thermal conductivity of paraffin/expanded graphite composite. *Solar Energy Materials and Solar Cells*, 128, 447–455. <https://doi.org/10.1016/j.solmat.2014.06.023>, (2014).
- [5] Ling, Z., Chen, J., Fang, X., Zhang, Z., Xu, T., Cao, X., & Wang, S. Experimental and numerical investigation of the application of phase change materials in a simulative power batteries thermal management system. *Applied Energy*, 121, 104–113. <https://doi.org/10.1016/j.applenergy.2014.01.075>, (2014).
- [6] Liu, X. H., Ling, Z. Y., Sun, W. G., Fang, X. M., Xu, T., & Zhang, Z. G. Experimental study and numerical simulation on thermal energy storage characteristics of composite phase change materials in annular space of vertical double-pipe heat exchanger. *Advanced Materials Research*, 1053, 143–149. <https://doi.org/10.4028/www.scientific.net/AMR.1053.143>, (2014).
- [7] Lv, Y., Zhou, W., & Jin, W. Experimental and numerical study on thermal energy storage of polyethylene glycol/expanded graphite composite phase change material. *Energy and Buildings*, 111, 242–252. <https://doi.org/10.1016/j.enbuild.2015.11.042>, (2016).
- [8] Mallow, A., Abdelaziz, O., & Graham, S. Thermal charging study of compressed expanded natural graphite/phase change material composites. *Carbon*, 109, 495–504. <https://doi.org/10.1016/j.carbon.2016.08.030>, (2016).
- [9] Mesalhy, O., Lafdi, K., Elgafy, A., & Bowman, K. Numerical study for enhancing the thermal conductivity of phase change material (PCM) storage using high thermal conductivity porous matrix. *Energy Conversion and Management*, 46(6), 847–867. <https://doi.org/10.1016/j.enconman.2004.06.010>, (2005).
- [10] Mills, A., Farid, M., Selman, J. R., & Al-Hallaj, S. Thermal conductivity enhancement of phase change materials using a graphite matrix. *Applied Thermal Engineering*, 26(14–15), 1652–1661. <https://doi.org/10.1016/j.applthermaleng.2005.11.022>, (2006).
- [11] Mitincik, S., & Yazici, M. Y. Numerical study on the thermal energy storage performance of graphite matrix composite with phase change in shell-in-tube: Effects of bulk density and wall temperature. *Journal of Energy Storage*, 72(PA), 108304. <https://doi.org/10.1016/j.est.2023.108304>, (2023).
- [12] Raza, G., Shi, Y., & Deng, Y. Expanded graphite as thermal conductivity enhancer for paraffin wax being used in thermal energy storage systems. *Proceedings of 2016 13th International Bhurban Conference on Applied Sciences and Technology, IBCAST 2016*, 1–12. <https://doi.org/10.1109/IBCAST.2016.7429846>, (2016).
- [13] Song, Y., Zhang, N., Jing, Y., Cao, X., Yuan, Y., & Haghghat, F. Experimental and numerical investigation on dodecane/expanded graphite shape-stabilized phase change material for cold energy storage. *Energy*, 189. <https://doi.org/10.1016/j.energy.2019.116175>, (2019).
- [14] Venkateswarlu, K., & Ramakrishna, K. Recent advances in phase change materials for thermal energy storage—a review. *Journal of the Brazilian Society of Mechanical Sciences and Engineering*, 44(1), 1–17. <https://doi.org/10.1007/s40430-021-03308-7>, (2022).
- [15] Voller, V. R., & Prakash, C. A fixed grid numerical modelling methodology for convection-diffusion mushy region phase-change problems. *International Journal of Heat and Mass Transfer*, 30(8), 1709–1719. [https://doi.org/10.1016/0017-9310\(87\)90317-6](https://doi.org/10.1016/0017-9310(87)90317-6), (1987).

[16] Xie, M., Huang, J., Ling, Z., Fang, X., & Zhang, Z. Improving the heat storage/release rate and photo-thermal conversion performance of an organic PCM/expanded graphite composite block. *Solar Energy Materials and Solar Cells*, 201. <https://doi.org/10.1016/J.SOLMAT.2019.110081>, (2019).

[17] Yazici, M. Y., Saglam, M., Aydin, O., & Avci, M. Thermal energy storage performance of PCM/graphite matrix composite in a tube-in-shell geometry. *Thermal Science and Engineering Progress*, 23 (2021) <https://doi.org/10.1016/J.TSEP.2021.100915>

[18] Zhang, Z., & Fang, X. (2006). Study on paraffin/expanded graphite composite phase change thermal energy storage material. *Energy Conversion and Management*, 47(3), 303–310. <https://doi.org/10.1016/J.ENCONMAN.2005.03.004>

[19] Zhong, Y., Li, S., Wei, X., Liu, Z., Guo, Q., Shi, J., & Liu, L. (2010). Heat transfer enhancement of paraffin wax using compressed expanded natural graphite for thermal energy storage. *Carbon*, 48(1), 300–304. <https://doi.org/10.1016/J.CARBON.2009.09.03>

¹SAMSUN UNIVERSITY, SAMSUN, 55120 TÜRKİYE
E-mail address: sare.mitincik@samsun.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 199-200

INVESTIGATION OF THE EFFECT OF NANOPARTICLE ADDITIVES ON THE REFRACTIVE INDEX AND DENSITY OF GASOLINE

MEHMET SELMAN ÇÖKMEN^{1*}, MEHMET FATİH PARLAK² and HASAN AYDOĞAN³

0000-0001-5043-1704, 0009-0000-8410-6547 and 0000-0003-1404-6352

ABSTRACT

In this study, the use of Al₂O₃ and TiO₂ nano particles with a size of 12 nm and a purity of 99.9% as gasoline fuel additives was investigated. The density and refractive index values of fuel mixtures with particle additives were compared to pure gasoline fuel. Fuel mixtures were prepared using a 3-level factorial design technique, and density and refractive index values were determined. The results showed that the Al₂O₃ nano particles, due to their high surface area, increased the density by 0.17% (3.5 ppm) and 1.22% (7 ppm), while TiO₂ nano particles increased the density by 0.22% (3.5 ppm) and 1.26% (7 ppm). It was observed that the nano particle with a higher surface area had a less significant effect on density. The refractive index values decreased by 0.11% (3.5 ppm) and 0.14% (7 ppm) for Al₂O₃ nano particles, and by 0.21% (3.5 ppm) and 0.24% (7 ppm) for TiO₂ nano particles. This study highlighted the importance of particle size, purity, and surface area in the selection of nano particles. Based on the evaluations and preliminary tests, nano particle levels above 15 ppm exhibited a tendency for agglomeration in the fuel. It is crucial to limit the total concentration to 15 ppm, especially for nano particles with a high surface area like Al₂O₃, to achieve homogeneous fuel.

Date: July, 8, 2023.

Key words and phrases. Nano Aluminum Oxide, Nano Titanium Dioxide, Gasoline Additive, Refractive Index, Density

REFERENCES

- [1] Acaroğlu, M., Aydoğan, H., & Özçelik, A. E. *Yakıtlar ve Yanma*. Nobel Akademik Yayıncılık, (2018).
- [2] Dehghani, M., Kazemi Shariat Panahi, H., Aghbashlo, M., Lam, S. S., & Abatafai, M. The effects of nanoadditives on the performance and emission characteristics of spark-ignition gasoline engines: A critical review with a focus on health impacts. *Energy*, 225. <https://doi.org/10.1016/j.energy.2021.10259>, (2021).
- [3] Gahlyan, S., Bhagat, P., Devi, R., Verma, S., Rani, M., & Maken, S. Thermodynamics of ternary mixtures with gasoline additive: Volumetric, acoustic and optical properties. *Journal of Molecular Liquids*, 304. <https://doi.org/10.1016/j.molliq.2020.112740>, (2020).
- [4] Hatami, M., Hasanpour, M., & Jing, D. Recent developments of nanoparticles additives to the consumables liquids in internal combustion engines: Part 1. Nano-fuels. *Journal of Molecular Liquids*, 318, 114250. <https://doi.org/10.1016/j.molliq.2020.114250>, (2020).
- [5] Karmakar, S. *Energetic Nanoparticles as Fuel Additives for Enhanced Performance in Propulsion Systems* (Issue August) [Doctoral Dissertation]. Louisiana State University, (2012).
- [6] Khan, S., Dewan, Y., Raghunathi, J., Shrivastava, A., & Sharma, V. Nanoparticles as fuel additive for improving performance and reducing exhaust emissions of internal combustion engines. In *International Journal of Environmental Analytical Chemistry* (Vol. 102, Issue 2, pp. 319–341). Taylor and Francis Ltd. <https://doi.org/10.1080/03067319.2020.1722810>, (2022).
- [7] Kotia, A., Chowdary, K., Srivastava, I., Ghosh, S. K., Ali, M. K. A., Hatami, M., Hasanpour, M., Jing, D., Zhang, Z., Lu, Y., Wang, F., Ma, X., Smallbone, A., Dong, C., Roskilly, A. P., Valihesari, M., Pirouzfard, V., Ommi, F., Zamankhan, F., ... Hancsó, J. Experimental investigation the effect of Mn₂O₃ nanoparticle on the performance and emission of SI gasoline fuel with mixture of ethanol and gasoline. *Fuel*, 149(4), 115904. <https://doi.org/10.1016/j.fuel.2019.115904>, (2020).
- [8] Naito, M., Yokoyama, T., Hosokawa, K., & Nogi, K. Nanoparticle Technology Handbook. In *Elsevier* (3). Elsevier, (2018).
- [9] Nikolaev, V. F., Tabrisov, I. I., Penkovsky, A. I., & Sultanova, R. B. Express method for total content assessment of aromatic hydrocarbons and oxygen in finished gasolines by refractometry and densimetry. *Fuel*, 142, 94–101. <https://doi.org/10.1016/j.fuel.2014.10.042>, (2015).
- [10] Nita, I., Iulian, O., Geacai, E., & Osman, S. Physico-chemical Properties of the Pseudo-binary Mixture Gasoline + 1-Butanol. *Energy Procedia*, 95, 330–336. <https://doi.org/10.1016/j.egypro.2016.09.017>, (2016).
- [11] Reif, K. Gasoline Engine Management Systems and Components. In *Springer Vieweg*. Springer Vieweg, (2015).
- [12] Srivastava, S. P., & Hancsó, J. Fuels and Fuel-Additives. In *John Wiley & Sons*. John Wiley & Sons, (2014).

^{1*} NECMETTİN ERBAKAN UNIVERSITY, SEYDİŞEHİR VOCATIONAL HIGH SCHOOL, DEPARTMENT OF MOTOR VEHICLES AND TRANSPORTATION TECHNOLOGIES, KONYA TÜRKİYE
E-mail address: msgokmen@erbakan.edu.tr

² ŞİFA KİMYA PHARMACEUTICALS COSMETICS INDUSTRY AND TRADE INC., MANAGER OF QUALITY CONTROL DEPARTMENT, KONYA TÜRKİYE
E-mail address: mfatihparlak@sifakimya.com.tr

³ SELCUK UNIVERSITY, TECHNOLOGY FACULTY, DEPARTMENT OF MECHANICAL ENGINEERING, CAMPUS, KONYA TÜRKİYE
E-mail address: haydogan@selcuk.edu.tr

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 201-202

EFFECT OF DIFFERENT BUILD ORIENTATIONS ON MECHANICAL PROPERTIES OF PARTS IN ADDITIVE MANUFACTURING TECHNOLOGY

DERYÖZ KARAHAN¹, and HÜCCET KAHRAMANZADE¹

¹0000-0001-5371-9332 and 0000-0002-9078-1933

ABSTRACT

With the developing technology, additive manufacturing productions are frequently preferred in various industrial applications such as automotive, defense industry, aerospace, and biomedical. It is very advantageous in terms of both production speed and obtaining the desired production model by enabling production with layers despite the geometric complexity of the model to be produced. The production of the models to be produced in the form of layers causes changes in the mechanical properties of the structures. The main influencing parameters are layer thickness, build orientation, production direction, and layer geometry. This study aims to experimentally determine the mechanical differences that the layer orientation angle will create in the structure. Standard tensile samples were produced by UV Stereolithography method, one of the additive manufacturing technologies. A commercial polymer-based liquid resin was used to produce tensile specimens positioned at 0°, 30°, 45°, and 90° angles. Stress-Strain curves of each sample were obtained by tensile tests at constant tensile speed. The mechanical properties of the tensile specimens produced at an angle of 45° showed the lowest mechanical performance compared to the other specimens. The reason for this is that the layers are combined with each other at 45°, where the maximum shear stress in a geometry occurs. Layer mergers corresponding to the shear plane showed lower strength, resulting in an earlier fracture of the specimen. Considering the experimental results, it is seen that the structure orientation directly affects the mechanical properties.

Date: July, 8, 2023.

Key words and phrases. Additive Manufacturing, Build Orientations, Mechanical, SLA,

REFERENCES

- [1] Tymrak, B. M., Kreiger, M., & Pearce, J. M. Mechanical properties of components fabricated with open-source 3-D printers under realistic environmental conditions. *Materials & Design*, 58, 242-246, (2014).
- [2] Chacón, J. M., Caminero, M. A., García-Plaza, E., & Núñez, P. J. Additive manufacturing of PLA structures using fused deposition modelling: Effect of process parameters on mechanical properties and their optimal selection. *Materials & Design*, 124, 143-157, (2017).
- [3] Mohanavel, V., Ali, K. A., Ranganathan, K., Jeffrey, J. S., Ravikumar, M. M., & Rajkumar, S. The roles and applications of additive manufacturing in the aerospace and automobile sector. *Materials Today: Proceedings*, 47, 405-409, (2021).
- [4] Wang, S., Ma, Y., Deng, Z., Zhang, K., & Li, B. Implementation of an elastoplastic constitutive model for 3D-printed materials fabricated by stereolithography. *Additive Manufacturing*, 33, 101104, (2020).
- [5] Wang, Y., Li, X., Chen, Y., & Zhang, C. (2021). Strain rate dependent mechanical properties of 3D printed polymer materials using the DLP technique. *Additive Manufacturing*, 47, 102368.

¹MECHANICAL ENGINEERING DEPARTMENT, ENGINEERING FACULTY, KARADENIZ TECHNICAL UNIVERSITY, TRABZON, TURKEY
E-mail address: deryakaraman@ktu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 203-204

ELIMINATION OF ACTUATION SINGULARITIES OF KINEMATICALLY REDUNDANT RPR-RPRR PLANAR PARALLEL ROBOTS

MUSTAFA ÖZLEMİR and MUHAMMED YASİR ÇUBUK

ORCID: 0009-0002-4981-9573, and 0009-0007-4480-9118

ABSTRACT

Parallel robots are used in a wide range of applications in industry and medicine. This wide range of applications is due to their many advantages, such as high accuracy, high rigidity, and high load capacity. On the other hand, parallel robots have a complicated singularity problem as their main drawback. The most critical singularities are Type II or actuation singularities. This paper studies the elimination of actuation singularities of kinematically redundant RPR-RPRR planar parallel robots.

REFERENCES

- [1] Merlet, J.-P. Parallel Robots, 2nd edition, Springer, Dordrecht, (2006).
- [2] Gosselin, C., Angeles, J. Singularity analysis of closed-loop kinematic chains. IEEE Transactions on Robotics and Automation, 6(3), 281-290, (1990).
- [3] Choudhury, P., Ghosal, A. Singularity and controllability analysis of parallel manipulators and closed-loop mechanisms. Mechanism and Machine Theory, 35(10), 1455-1479, (2000).
- [4] Ider, S. K. Inverse dynamics of parallel manipulators in the presence of drive singularities. Mechanism and Machine Theory, 40(1), 33-44, (2005).
- [5] Ozgoren, M. K. Kinematic and kinetostatic analysis of parallel manipulators with emphasis on position, motion, and actuation singularities. Robotica, 37(4), 599-625, (2019).
- [6] Özdemir, M. Removal of singularities in the inverse dynamics of parallel robots. Mechanism and Machine Theory, 107, 71-86, (2017).
- [7] Özdemir, M. High-order singularities of 5R planar parallel robots. Robotica, 37(2), 233-245, (2019).

Date: July, 8, 2023.

Key words and phrases. Parallel robot, planar parallel robot, kinematic redundancy, actuation singularity.

- [8] Özdemir, M. Hypersingularities of 3-RRR planar parallel robots. *Proceedings of the Romanian Academy Series A-Mathematics Physics Technical Sciences Information Science*, 22(4), 353–360, (2021).
- [9] Luces, M., Mills, J. K., Benhabib, B. A review of redundant parallel kinematic mechanisms. *Journal of Intelligent & Robotic Systems*, 86(2), 175–198, (2017).
- [10] Ganovski, L., Fiset, P., Samin, J. C. Piecewise overactuation of parallel mechanisms following singular trajectories: Modeling, simulation and control. *Multibody System Dynamics*, 12(4), 317–343, (2004).
- [11] Saglia, J. A., Dai, J. S., Caldwell, D. G. Geometry and kinematic analysis of a redundantly actuated parallel mechanism that eliminates singularities and improves dexterity. *Journal of Mechanical Design-Transactions of the ASME*, 130(12), 124501, (2008).
- [12] Shin, K., Yi, B.-J., Kim, W. Parallel singularity-free design with actuation redundancy: A case study of three different types of 3-degree-of-freedom parallel mechanisms with redundant actuation. *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science*, 228(11), 2018–2035, (2014).
- [13] Saafi, H., Laribi, M. A., Zegloul, S. Redundantly actuated 3-RRR spherical parallel manipulator used as a haptic device: improving dexterity and eliminating singularity. *Robotica*, 33(5), 1113–1130, (2015).
- [14] Li, S., Liu, Y., Cui, H., Niu, Y., Zhao, T. Synthesis of branched chains with actuation redundancy for eliminating interior singularities of 3T1R parallel mechanisms. *Chinese Journal of Mechanical Engineering*, 29(2), 250–259, (2016).
- [15] Kotlarski, J., Heimann, B., Cossier, T. Influence of kinematic redundancy on the singularity-free workspace of parallel kinematic machines. *Frontiers of Mechanical Engineering*, 7(2), 120–134, (2012).
- [16] Gosselin, C., Lambert, T., Veillette, A. Singularity-free kinematically redundant planar parallel mechanisms with unlimited rotational capability. *IEEE Transactions on Robotics*, 31(2), 457–467, (2015).
- [17] Gosselin, C., Scheiber, L.-T. Kinematically redundant spatial parallel mechanisms for singularity avoidance and large orientational workspace. *IEEE Transactions on Robotics*, 32(2), 286–300, (2016).
- [18] Isaacson, M. Kinematically redundant planar parallel mechanisms for optimal singularity avoidance. *Journal of Mechanical Design-Transactions of the ASME*, 139(4), 042302, (2017).
- [19] Parsa, S. S., Boudreau, R., Carretero, J. A. Reconfigurable mass parameters to cross direct kinematic singularities in parallel manipulators. *Mechanism and Machine Theory*, 85, 53–63, (2015).
- [20] Agarwal, A., Nasa, C., Bandyopadhyay, S. Dynamic singularity avoidance for parallel manipulators using a task-priority based control scheme. *Mechanism and Machine Theory*, 96, Part 1, 107–126, (2016).
- [21] Gao, Y., Chen, K., Gao, H., Xiao, P., Wang, L. Small-angle perturbation method for moving platform orientation to avoid singularity of asymmetrical 3-RRR planar parallel manipulator. *Journal of the Brazilian Society of Mechanical Sciences and Engineering*, 41(12), 538, (2019).
- [22] Sefrioui, J., Gosselin, C. M. On the quadratic nature of the singularity curves of planar three-degree-of-freedom parallel manipulators. *Mechanism and Machine Theory*, 30(4), 533–551, (1995).
- [23] Ider, S. K. Singularity robust inverse dynamics of planar 2-RPR parallel manipulators. *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science*, 218(7), 721–730, (2004).

DEPARTMENT OF MECHANICAL ENGINEERING, FACULTY OF ENGINEERING, MARMARA UNIVERSITY,
RECEP TAYYİP ERDOĞAN CAMPUS, 34854 MALTEPE, İSTANBUL, TÜRKİYE
E-mail address: mustafa.ozdemir@marmara.edu.tr

DEPARTMENT OF MECHANICAL ENGINEERING (ENGLISH), INSTITUTE OF PURE AND APPLIED SCIENCES,
MARMARA UNIVERSITY, GÖZTEPE CAMPUS, 34722 KADIKÖY, İSTANBUL, TÜRKİYE
E-mail address: yasircubuk97@gmail.com

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 205-207

INVESTIGATION OF THE CAPACITY FACTOR OF THE EGE REGION WIND POWER PLANTS ACCORDING TO THE REAL PRODUCTIONS

İBRAHİM KARADÖL

0000-0002-9239-0565

ABSTRACT

With the developing industry and technology, the need for energy has also increased. Meeting the increasing energy demand from renewable energy sources is encouraged by the states. In the last 10 years, Turkey has prepared many incentive packages in this field by turning to domestic and national resources in the energy sector. Before the installation of renewable energy power plants, some criteria of the facility should be investigated and analyzed. The feasibility studies carried out before the investment in wind power plants allows optimum operation of existing resources and maximum benefit from these resources. In addition, financial and technical issues (depreciation period, turbine selection, etc.) can be predicted according to the feasibility study. This study aims to obtain information about the capacity factor of the region and the provinces in the region by using the real production of 86 facilities in the Ege region. For this purpose, the provinces' annual average, maximum, and minimum capacity factors were calculated according to the facilities' production in the Ege region in 2022. According to the calculations, the annual average capacity factor of the Ege Region is 34.4%. The average annual capacity factors of İzmir, Manisa, Aydın, Muğla, Uşak, Denizli, and Afyonkarahisar provinces were calculated as 39.9%, 38.6%, 32.8%, 33.9%, 29.3%, 34.5%, and 31.8%, respectively. According to all these results, it is predicted that it will be beneficial for the investor to give priority to İzmir in site selection for the new facilities to be established in the Ege Region.

Date: July, 8, 2023.

Key words and phrases. Wind Energy, Capacity Factor, Ege Region

- [1] S. Zhang, C. Wang, P. Liao, L. Xiao, ve T. Fu, "Wind speed forecasting based on model selection, fuzzy cluster, and multi-objective algorithm and wind energy simulation by Betz's theory," *Expert Syst. Appl.*, vol. 193, no. January, p. 116509, doi: 10.1016/j.eswa.2022.116509,(2022).
- [2] E. Günay and S. Yıldırım, "Yenilenebilir Enerji Kapasitesi Açısından Türkiye'nin Durumu," in *V. Uluslararası Kahramanmaraş Yönetim, Ekonomi ve Siyaset Kongresi*, pp. 21-31,(2022).
- [3] IRENA, *Renewable Capacity Statistics 2022*. 2021.
- [4] IRENA, "IRENA' s Renewable Energy Roadmap-Renewable energy policy targets for REmap countries," 2020.
- [5] "T.C. Enerji ve Tabii Kaynaklar Bakanlığı." <https://enerji.gov.tr/enerji-merkezi-enerji-elektrik#:~:text=2022>. (accessed May 01, 2023).
- [6] A. Ucar ve F. Balo, "Assessment of wind power potential for turbine installation in coastal areas of Turkey," *Renew. Sustain. Energy Rev.*, vol. 14, no. 7, pp. 1901-1912, doi: 10.1016/j.rser.2010.03.021,(2010).
- [7] E. Koç ve M. C. Şenel, "Dünyada ve Türkiye'de Enerji Durumu," *Mühendis ve Makina*, pp. 1-4, 2013.
- [8] M. E. Şahin, "Açık Deniz Rüzgâr Sistemleri Üzerine Bir İnceleme ve Danimarka Modeli," *Recep Tayyip Erdoğan Üniversitesi Fen ve Mühendislik Bilim. Derg.*, vol. 1(1), no. 1, pp. 54-67, 2020.
- [9] TÜREB, "2018 Yılı Türkiye Rüzgâr Enerjisi İstatistikleri," 2019.
- [10] A. Koç, H. Yağlı, Y. Koç, ve M. Uğurlu, "Dünyada ve Türkiye' de Enerji Görünümünün Genel Değerlendirilmesi," *Mühendis ve Makina Derg.*, vol. 59, no. 692, pp. 84-112, 2018.
- [11] GAZBİL, "Dünyada ve Türkiye'de Enerji Durumu," 2017.
- [12] H. Genel ve I. Tarhan, "Rüzgar Enerjisinin Önemli Geçiş Yerlerinden Olan Çanakkale Bölgesindeki Bazı Rüzgar Enerji Santrelleri için Kapasite Faktörü İncelemesi," pp. 120-139, 2019.
- [13] C. Yıldız ve M. A. Akgül, "Türkiye' nin Akdeniz kıyılarında açık deniz güneş ve rüzgâr enerjisi üretiminin verim bazlı karşılaştırılması," *BAUN Fen Bil. Enst. Derg.*, vol. 25, no. 1, pp. 122-136, doi: 10.25092/baunfbcd, (2023).
- [14] W. Dong, G. Zhao, S. Yüksel, H. Dinçer, ve G. G. Ubay, "A novel hybrid decision making approach for the strategic selection of wind energy projects," *Renew. Energy*, vol. 185, pp. 321-337, doi: 10.1016/j.renene.2021.12.077,(2022).
- [15] Ş. Kavcıoğlu, "Yenilenebilir Enerji VeTürkiye," *Finans. Araştırmalar ve Çalışmalar Derg.*, pp. 209-227, doi: 10.14784/marufacd.623399, (2019).
- [16] B. Kapsuz ve Y. Uzun, "Dünyada ve Türkiyede Rüzgar Enerjisi," November, 2022.
- [17] M. C. Şenel ve E. Koç, "Dünyada ve Türkiye' de Rüzgar Enerjisi durumu genel değerlendirme," *Eng. Mach.*, vol. 56, no. 663, pp. 46-56, 2015.
- [18] KPMG, "Enerji Sektörel Bakış," 2019.
- [19] TMMOB, "Türkiye'de Elektrik Enerjisi İstatistikleri," 2020.
- [20] "Küresel Elektrik İncelemesi 2022 | Kor." <https://ember-climate.org/insights/research/global-electricity-review-2022/> (accessed May 19, 2023).
- [21] İ. Karadöl, C. Yıldız, ve M. Şekkeli, "Determining optimal spatial and temporal complementarity between wind and hydropower," *Energy*, vol. 230, doi: 10.1016/j.energy.2021.120790, (2021).
- [22] C. Hakyemez, "Türkiye Sınai Kalkınma Bankası Aylık Enerji Bülteni," 2022.
- [23] D. S. Chavan diğ., "Installation," in *2017 International Conference on circuits Power and Computing Technologies*, pp. 1-5, (2017).
- [24] Z. Yang, Y. Lin, ve S. Dong, "Joint Model of Wind Speed and Corresponding Direction Based on Wind Rose for Wind Energy Exploitation," *J. Ocean Univ. China*, vol. 21, no. 4, pp. 876-892, doi: 10.1007/s11802-022-4860-2, (2022).

- [25] R. Bharani ve A. Sivaprakasam, "Meteorosoft: a excel function for wind data processing and rose diagram," *Earth Sci. Informatics*, vol. 13, no. 3, pp. 965-971, doi: 10.1007/s12145-019-00435-7,(2020).
- [26] R. Zahedi, M. Ghorbani, S. Daneshgar, S. Gitifar, ve S. Qezelbigloo, "Potential measurement of Iran's western regional wind energy using GIS," *J. Clean. Prod.*, vol. 330, no. November 2021, p. 129883, doi: 10.1016/j.jclepro.2021.129883, (2022).
- [27] V. Femin, R. Veena, I. Petra, S. Mathew, ve J. Hazra, "Modelling the ramping behaviour of wind turbines," doi: 10.1109/COGEN.2016.7728967, (2016).
- [28] L. Söder diğ., "Review of wind generation within adequacy calculation and capacity markets for different power systems," *Renew. Sustain. Energy Rev.*, vol. 119, no. November 2019, doi: 10.1016/j.rser.2019.109540, (2020).
- [29] H. Demolli, A. S. Dokuz, A. Ecemis, ve M. Gokcek, "Wind power forecasting based on daily wind speed data using machine learning algorithms," *Energy Convers. Manag.*, vol. 198, no. July, p. 111823, doi: 10.1016/j.enconman.2019.111823, (2019).
- [30] Q. Cheng diğ., "Complementary operation with wind and photovoltaic power induces the decrease in hydropower efficiency," *Appl. Energy*, vol. 339, no. March, p. 121006, doi: 10.1016/j.apenergy.2023.121006, (2023).
- [31] Q. Li, J. Wang, ve H. Zhang, "Comparison of the goodness-of-fit of intelligent-optimized wind speed distributions and calculation in high-altitude wind-energy potential assessment," *Energy Convers. Manag.*, vol. 247, no. 217, p. 114737, doi: 10.1016/j.enconman.2021.114737, (2021).
- [32] L. Wang, T. H. Yeh, W. J. Lee, ve Z. Chen, "Benefit evaluation of wind turbine generators in wind farms using capacity-factor analysis and economic cost methods," *IEEE Trans. Power Syst.*, vol. 24, no. 2, pp. 692-704, doi: 10.1109/TPWRS.2009.2016519, (2009).
- [33] M. H. Arjadi ve E. F. El-Saadany, "Wind turbines capacity factor modeling-A novel approach," *IEEE Trans. Power Syst.*, vol. 24, no. 3, pp. 1627-1638, doi: 10.1109/TPWRS.2009.2023274, (2009).
- [34] A. A. Akkaş, "Rüzgar Enerjisi Sistemlerinin Performans Değerlendirmesi," *Rüzgar Enerj. Sempozyumu*, no. April, pp. 75-84, Online Available: <http://www.ruzgarsempozyumu.org/wp-content/uploads/2014/08/008.pdf>, (2001).

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 208-209

A HYBRID DEEP REINFORCEMENT LEARNING ALGORITHM APPLICATION FOR VEHICLE ROUTING PROBLEM

M. ATMIŞ and T. GÖÇKEN

ABSTRACT

Vehicle Routing Problem attempts to determine the optimal routes for a fleet of vehicles to deliver demanded needs to customers, considering the changing requirements and uncertainties in the transportation environment. In this study, developing a hybrid solution algorithm using deep reinforcement learning approaches and metaheuristic algorithms that are suitable for the problem is considered. At first, a constructive heuristic algorithm is used to generate an initial solution. Then, a double deep Q network-based deep reinforcement learning and a simulated annealing algorithm work collaboratively. The computational result shows that the proposed algorithm is promising in routing optimization.

REFERENCES

- [1] G. B. Dantzig, J. H. Ramser, The truck dispatching problem, *Management science*, 6(1), 80-91, (1959).
- [2] R. S. Sutton, A. G. Bartow, *Reinforcement Learning: An Introduction*, MIT Press, Second Edition, (2020).
- [3] M. Nazari, A. Oroojlooy, L. Snyder, M. Takác, Reinforcement learning for solving the vehicle routing problem, *Advances in neural information processing systems*, 31, (2018).
- [4] K. Zhang, F. He, Z. Zhang, X. Lin, M. Li, Multi-vehicle routing problems with soft time windows: A multi-agent reinforcement learning approach, *Transportation Research Part C: Emerging Technologies*, 121, 102861, (2020).
- [5] J. Zhao, M. Mao, X. Zhao, J. Zou, A hybrid of deep reinforcement learning and local search for the vehicle routing problems, *IEEE Transactions on Intelligent Transportation Systems*, 22(11), 7208-7218, (2020).
- [6] J. Li, Y. Ma, R. Gao, Z. Cao, A. Lim, W. Song, J. Zhang, Deep reinforcement learning for solving the heterogeneous capacitated vehicle routing problem, *IEEE Transactions on Cybernetics*, 52(12), 13572-13585, (2021).

Date: July, 8, 2023.

Key words and phrases. Deep reinforcement learning, Simulated annealing, Vehicle routing problem, Optimization, Machine learning.

- [7] J. Li, L. Xin, Z. Cao, A. Lim, W. Song, J. Zhang, Heterogeneous attentions for solving pickup and delivery problem via deep reinforcement learning, *IEEE Transactions on Intelligent Transportation Systems*, 23(10), 2306-2315, (2021).
- [8] Z. Zhang, Z. Wu, H. Zhang, J. Wang, Meta-Learning-Based Deep Reinforcement Learning for Multiobjective Optimization Problems, *IEEE Transactions on Neural Networks and Learning Systems*, (2022).
- [9] W. Pan, S. Q. Liu, Deep reinforcement learning for the dynamic and uncertain vehicle routing problem, *Applied Intelligence*, 1-18, (2022).
- [10] B. E. Gillett, L. R. Miller, A heuristic algorithm for the vehicle-dispatch problem, *Operations research*, 22(2), 340-349, (1974).
- [11] F. Kosanoglu, M. Atmis, H. H. Turan, A deep reinforcement learning assisted simulated annealing algorithm for a maintenance planning problem, *Annals of Operations Research*, 1-32, (2022).
- [12] C. J. C. H. Watkins, P. Dayan, Q-learning, *Machine Learning*, 8, 279-292, (1992). <https://doi.org/10.1007/BF00992698>
- [13] V. Mnih, K. Kavukcuoglu, D. Silver, A. Graves, I. Antonoglou, D. Wierstra, M. Riedmiller, Playing Atari with deep reinforcement learning, *arXiv:1312.5602*, (2013).
- [14] H. van Hasselt, A. Guez, D. Silver, Deep reinforcement learning with double Q-learning, *Proceedings of the AAAI conference on artificial intelligence*, Vol. 30, No. 1, (2016).
- [15] J. Huang, Q. Chang, J. Arinez, Deep reinforcement learning based preventive maintenance policy for serial production lines, *Expert Systems with Applications*, 160, 113701, (2020).
- [16] S. Kirkpatrick, C. D. Gelatt, M. P. Vecchi, Optimization by simulated annealing, *Science*, 220, 671-680, (1983).

DEPARTMENT OF INDUSTRIAL ENGINEERING, ADANA ALPARSLAN TÜRKES SCIENCE AND TECHNOLOGY
UNIVERSITY, ADANA, TURKEY.
E-mail address: myaktubay@atu.edu.tr

DEPARTMENT OF INDUSTRIAL ENGINEERING, ADANA ALPARSLAN TÜRKES SCIENCE AND TECHNOLOGY
UNIVERSITY, ADANA, TURKEY.
E-mail address: tgocken@atu.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 210

ON RELIABILITY ANALYSIS OF REFERENCE INTERVALS IN MEDICINE

GÜLSEN KILINÇ

0000-0002-9657-2577

ABSTRACT

Fuzzy logic has several practical applications in the world of medical data. Reference ranges is just one of them. It is one of the most significant aspects that influences how doctors decide how to diagnose and treat patients. Therefore, in terms of diagnosis and therapy, the precision of these intervals is crucial. This paper presents a method for testing interval reliability in accordance with fuzzy logic data.

REFERENCES

- [1] De Luca, A., Termini, S. A definition of a nonprobabilistic entropy in the setting of fuzzy sets theory. *Information and Control*, 20, 301-312, (1972).
- [2] Bede B. *Mathematics of Fuzzy Sets and Fuzzy Logic*. Springer-Verlag Berlin Heidelberg, ISSN:1434-9922, (2013).
- [3] Edward A. How to Define and Determine Reference Intervals in the Clinical Laboratory. *Clinical and laboratory standards institute NCCLS, Approved Guideline Second Edition.C28 A2*, 20(13), (2000).
- [4] Dhar, M. On Some Properties of Entropy of Fuzzy Numbers. *I.J. Intelligent Systems and Applications*, 03, 66-73, (2013)

¹DEPARTMENT OF MATHEMATICS AND SCIENCE EDUCATION, FACULTY OF EDUCATION, ADIYAMAN UNIVERSITY, ADIYAMAN, 02040, TURKEY
E-mail address: gkilinc@adiyaman.edu.tr

Date: July, 8, 2023.

Key words and phrases. Entropy, Reference Range, Fuzzy set

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 211-212

CARBON FOOTPRINT CALCULATION AND MITIGATION STRATEGIES FOR THE TRANSPORTATION AGAINST CLIMATE CHANGE: PESTEL ANALYSIS

ŞÖLEN ZELİNCİN¹, FATMA ERSOY DURAN^{2*} and EMEL YONTAR³

0000-0003-2363-1254, 0000-0003-2749-5018 and 0000-0001-7800-2960

ABSTRACT

With the awareness of the disasters that will be caused by greenhouse gas and therefore climate change, important developments are taking place in the agenda of countries for the solution of the problem, and they aim to reduce the greenhouse gas emissions they release for a sustainable world. The source of the increase in greenhouse gas intensity is attributed to the increase in the CO₂ rate in the air, and the main factor in the increase of the CO₂ rate is the burning of fossil fuels and human activities, while the starting point of the emission reduction targets of the countries can mostly be the transportation sector. Because a significant part of greenhouse gas emissions is from transportation. For this reason, reducing carbon emissions in the transportation sector is an important issue and constitutes the aim of the study. Carbon emission is a measure of the damage done by human activities to the environment in terms of the amount of greenhouse gases produced. For this reason, a carbon footprint study for the transportation network was applied by selecting the pilot region of Mersin province Yenişehir district in the study. Considering that unmeasurable parameters cannot be managed, as a first step, bus, private vehicle, minibus, sea transportation etc. in the transportation network. emissions are taken into account. Carbon emission values were calculated through the Co2nectorPro software and the resulting values were compared with the studies in the literature, and the stage of developing a district-based strategy for the transportation sector was started. Strategies that can contribute positively to urban sustainability have been developed with the help of PESTEL analysis within the framework of sustainability. It is desired that the study, in which greenhouse gas emissions are expressed in terms of carbon dioxide, and which includes different strategies such as reducing fuel consumption in reducing carbon footprint, developing alternative fuel types, sustainability activities and working on fuel savings, will be an important sharing tool across the city and across the country. Within the scope of sustainability, the study has an important potential as it will contribute positively to climate change by aiming to reduce carbon emissions.

Date: July, 8, 2023.

Key words and phrases. Carbon footprint, climate change, PESTEL analysis, process improvement

REFERENCES

- [1] Barton, J. R., Dalley, D., & Patel, V. S. Life cycle assessment for waste management. *Waste management*, 16(1-3), 35-50, (1996).
- [2] Claeys, G., Tagliapietra, S., & Zachmann, G. How to make the European Green Deal work (Vol. 5). Brussels, Belgium: Bruegel, (2019).
- [3] Dong, Y. H., & Ng, S. T. A modeling framework to evaluate sustainability of building construction based on LCSA. *The international journal of life cycle assessment*, 21, 555-568, (2016).
- [4] Environmental Management-Life Cycle Assessment- Principles and Framework, ISO 14040, 2006.
- [5] Environmental Management-Life Cycle Assessment - Requirements and Guidelines, ISO 14044, 2006.
- [6] Haksevenler, B. H. G., Onat, N. C., Akpınar, B., & Bedel, T. Yerel yönetimler için karbon ayak izinin belirlenmesi: Ümraniye belediyesi örneği. *Doğal Afetler ve Çevre Dergisi*, 6(2), 319-333, (2020).
- [7] <https://www.epd.gov.tr/iletay/icerik/3-0-168/resmi-istatistikleri> (Erişim tarihi: 02.06.2023).
- [8] International Organization for Standardisation (ISO). "ISO 14044: Environmental Management-Life Cycle Assessment- Requirements and Guidelines". Geneva, Switzerland, 13.02.10, 2006
- [9] Jimenez-Gonzalez, 2000; http://www.worldlingo.com/ma/enwiki/en/Life_cycle_assessment).
- [10] Merici, M. E., & Berberoğlu, S. Türkiye perspektifinde yeşil mutabakat ve karbon ayak izi: tehdit mi? fırsat mı? *Doğal Afetler ve Çevre Dergisi*, 8(1), 156-164, (2022).
- [11] Onat, N. C., Kucukvar, M., & Tatari, O. Integrating triple bottom line input-output analysis into life cycle sustainability assessment framework: the case for US buildings. *The International Journal of Life Cycle Assessment*, 19, 1488-1505, (2014).
- [12] TÜİK, Sera Gazı Emisyon İstatistikleri, (2023). 1990-2021, <https://data.tuik.gov.tr/Search/Search?text=sera%20gaz%C4%B1%20emisyonu> (Erişim tarihi: 17.05.23)
- [13] U.S. Environmental Protection Agency, Life Cycle Assessment: Principles and Practice, EPA/600/R-06/060, May 2006, National Risk Management Research Laboratory, Office of Research and Development, Cincinnati, Ohio, USA, (2006).

¹TARSUS UNIVERSITY, FACULTY OF ENGINEERING, DEPARTMENT OF INDUSTRIAL ENGINEERING, MERSİN TÜRKİYE
E-mail address: solenzengin@tarsus.edu.tr

²TARSUS UNIVERSITY, FACULTY OF ENGINEERING, DEPARTMENT OF INDUSTRIAL ENGINEERING, MERSİN TÜRKİYE
E-mail address: fatmaersoy@tarsus.edu.tr

³TARSUS UNIVERSITY, FACULTY OF ENGINEERING, DEPARTMENT OF INDUSTRIAL ENGINEERING, MERSİN TÜRKİYE

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 213-214

THE EFFECTS OF COLLECTOR PLATE MATERIAL ON FIBER FINENESS IN ELECTROSPINNING

GONCA ŞİMŞEK GÜNDÜZ

0000-0002-3355-0645

ABSTRACT

In the electrospinning method, polymer fibers with nano diameters are obtained from the polymer solution with the effect of the electric field. In the study, nanofibers were produced from polyacrylonitrile (PAN) solution using a needle electro-spinning device. An electrostatic field was created between the polymer solution drop at the needle tip and the metal collector plate. The applied voltage caused the polymer solution drop to be sprayed from the needle. Due to the electrical forces, the solution drop elongated and became a very fine fiber, accumulated on the collector, and a very long, randomly distributed fiber network was obtained. There are many parameters that affect the electrospinning method. The collector plate material is one of these parameters. The aim of this study is to compare the diameters of the fibers obtained by using metal plates of different materials as collectors. For this purpose, circular shaped, 1 mm thick aluminum, copper, brass and stainless steel plates were used as collectors. This study differs from other studies in terms of using multi-materials. The diameters of the obtained nanofibers were measured by scanning electron microscopy (SEM). SPSS program was used to compare the diameter values statistically. The thinnest fibers were obtained statistically with the copper plate collector, and the thickest fibers were obtained with the stainless steel plate collector. The conductivity of copper is higher than aluminum, brass and stainless steel. The conductivity of stainless steel is lower than other materials used. It was observed that finer fibers were obtained as the conductivity increased. It is thought that the nanofibers become thinner as a result of further elongation of the polymer jets with increasing conductivity. Thus, it has been observed that the collector plate material affects the fiber fineness, and as the material conductivity increases, finer fibers can be obtained.

Date: July, 8, 2023.

Key words and phrases. Electrospinning, Collector plate material, Nanofiber fineness, PAN.

REFERENCES

- [1] J. M. Deitzel, J. Kleinmeyer, D. Haris, N. C. Beck Tan, The Effect of Processing Variables on The Morphology of Electrospun Nanofibers and Textiles, *Polymer*, 42, 261-272, (2001).
- [2] S. Ramakrishna, K. Fujihara, W.-E. Teo, T.-C. Lim, Z. Ma, An Introduction to Electrospinning and Nanofibers, World Scientific Publishing Co. Pte. Ltd., Singapore, (2005).
- [3] A.L. Andrady, Science and Technology of Polymer Nanofibers, Wiley Pres, New Jersey, (2008).
- [4] F. Göktepe, G. Şimşek, Ö. Göktepe, S. Çömlekçi, The Effect of Material and Thickness of Collector Electrode on Fiber Fineness in Electrospinning, The Fiber Society Spring 2010 International Conference, Turkey, (2010).
- [5] B. Sabit, Elektro Lif Çekim (Electrospinning) Yöntemiyle Üretilen Nanolif İplik Özelliklerinin İyileştirilmesi, Tekirdağ Namık Kemal Üniversitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, Tekirdağ, (2019).
- [6] H. Pan, L. Li, L. Hu, X. Cui, Continuous Aligned Polymer Fibers Produced by a Modified Electrospinning Method, *Polymer*, 47, 4901-4904, (2006).
- [7] Z. M. Huang, Y. Z. Zhang, M. Kotaki, S. Ramakrishna, A review on polymer nanofibers by electro-spinning applications in nanocomposites. *Composites Science and Technology*, 63(15), 2223-2253, (2003).\\ [https://doi.org/10.1016/S0263-3538\(03\)00178-7](https://doi.org/10.1016/S0263-3538(03)00178-7).
- [8] M. İpek, M. F. Çınbolat, Farklı Tipteki Toplayıcı Plakaların Elektrostatik Çekim ile Elde Edilen Nanoliflerin Morfoloji Üzerine Etkilerinin Araştırılması, *Fırat Üniv. Müh. Bil. Dergisi*, 29(1), 161-170, (2017).
- [9] H. Q. Liu, Y. L. Hsieh, Ultrafine fibrous cellulose membranes from electrospinning of cellulose acetate, *Journal of Polymer Science Part B: Polymer Physics*, 40(18), 2119-2129, (2002).
- [10] J. Stanger, N. Tucker, A. Wallace, N. Larsen, M. Staiger, R. Reeves, The Effect of Electrode Configuration and Substrate Material on the Mass Deposition Rate of Electrospinning, *Journal of Applied Polymer Science*, 112(3), 1729-1737, (2009).

DEPARTMENT OF TEXTILE TECHNOLOGY, DENİZLİ TECHNICAL SCIENCES VOCATIONAL SCHOOL,
DENİZLİ, TÜRKİYE
E-mail address: gsimsek@pau.edu.tr

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 215-216

PRODUCTION OF SUCKER ROD AND DETERMINATION OF ITS MECHANICAL PROPERTIES AND LOCALIZATION OF THIS PRODUCT

KÜRŞAT TAHTI^{*1}, BERGAH UYSAL², GÖKHAN ACIYİYEN

0000-0003-4794-4554

ABSTRACT

Generally, oil wells in the early stages of their life naturally flow to the surface and are referred to as flowing wells. Flowing production means that the pressure at the bottom of the well is sufficient to overcome the sum of the pressure losses along the flow path to the separator. When this criterion is not met, natural flow ceases and the well dies. In this case, artificial lift methods are used.

There are various lifting mechanisms available for the production engineer to choose from. One group of commonly used artificial lift methods uses a type of pump placed below the fluid level to increase the pressure of the well flow to overcome pressure losses along the flow path. Other lifting methods use compressed gas injected from the surface into well tubing to help bring well fluids to the surface.

In this study, the necessary researches for the production of Sucker Rod "Oil Pumping Shaft", which was realized for the first time in our country by using the rod type pumping method among the pumping methods among the artificial lifting mechanisms, were carried out and manufactured. After the conceptual process setup of the production process was completed, a work order was issued and the production of our products started. Especially in mold design, the final mold design was carried out with mold revision studies after the initial design in order to ensure the repeatability that will ensure the continuity of quality in production. Raw material acceptance, hot forging in a horizontal press, normalized heat treatment, machining and threading, quality control and laboratory processes, sandblasting and coating were carried out to reach the final product. Within the framework of the quality control plan, the quality of the products was guaranteed by destructive non-destructive inspections after the relevant processes. With this work, an application was made for API certification and a product was localized as the 11th country with this certificate.

Date: July, 8, 2023.

Key words and phrases. Oil, manufacturing, design, sucker rod

REFERENCES

- [1] Lea JF. Artificial lift selection. Chapter 10 in SPE Petroleum Engineering Handbook, vol. IV. Society of Petroleum Engineers; 2007.
- [2] www.alrdc.com.
- [3] Artificial lift systems brochure. Houston, Texas: Weatherford Co; 2007.
- [4] History of petroleum engineering. New York: American Petroleum Institute; 1961.
- [5] Rothrock Jr R. Maintenance, workover costs to top \$3 billion. PEI; July 1978. 19-21.
- [6] Moore SD. Well servicing expenditures activity drop substantially. PEI; July 1986. 20-1,24,26.
- [7] Grigorashenko GI. General features of the technical and technological developments in oil production. in Russian. Nef'tyanoe Khozyaystvo; July 1974. 28-33.
- [8] Clegg JD. Artificial lift producing at high rates. Proc. 32nd Southwestern petroleum short course. 1985. p. 333-353.
- [9] Clegg JD. High-rate artificial lift. JPT; March 1988. 277-82.
- [10] Byrd JP. Pumping deep wells with a beam and sucker rod system. Paper SPE 6436 presented at the deep drilling and production symposium of the SPE, Amarillo, Texas. April 17-19, 1977.
- [11] Ghazeeb MM, Shedid SA, Ibrahim M. Simulation investigations for enhanced performance of beam pumping system for deep, high-volume Wells. Paper SPE 108284 presented at the international oil conference and exhibition held in Veracruz, Mexico. June 27-30, 2007.
- [12] Henderson LJ. Deep sucker rod pumping for gas well unloading. Paper SPE 13199 presented at the 59th annual technical conference and exhibition of SPE, Houston, Texas. September 16-19, 1984.
- [13] Wilson JW. Shell runs 14,500-ft sucker rod completion. PEI; Dec. 1982. 48-9.
- [14] Gott CI. Successful rod pumping at 14,500 ft. Paper SPE 12198 presented at the 58th annual technical conference and exhibition of the SPE, San Francisco, California. October 5-8, 1983.

BERDAN CIVATA ENERJİ İMALAT SAVUNMA SANAYİ VE LABORATUVAR HİZMETLERİ TİCARET A.Ş.,
MERSİN, TÜRKİYE
kursat.kahya@berdancivata.com

BERDAN CIVATA ENERJİ İMALAT SAVUNMA SANAYİ VE LABORATUVAR HİZMETLERİ TİCARET A.Ş.,
MERSİN, TÜRKİYE
dergah.uysal@berdan.com.tr

BERDAN CIVATA ENERJİ İMALAT SAVUNMA SANAYİ VE LABORATUVAR HİZMETLERİ TİCARET A.Ş.,
MERSİN, TÜRKİYE
gokhan.aciyiyen@berdancivata.com

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 217-218

DETECTION OF EFFECT OF SMART ROBOT AUTOMATION ON QUALITY AND EFFICIENCY IN PRODUCTION

KÜTÜKÇÜ SAHİN, SEREN GEÇGEL, SEDA YÜCEL

0000-0003-4794-4554

ABSTRACT

In this study, an industrial robot system and its sub-equipment, which can control two CNC machining centers at the same time, CNC part insertion, removal and part transfer to the fully automatic control system, and transfer of finished parts to the smart pallet system, were installed and trial productions were carried out. Thanks to this application, which sets an example for the sector and the region, it has become possible to realize more efficient, high quality and error-free productions under heavy working conditions. During the installation and trial productions, support was received from technical experts and 4 experts were trained in this field.

Within the scope of the study, the effects of intelligent robot automation on quality and efficiency in production were examined. Although there was no change in the machining times of the part on our CNC machining machines, the total cycle time was improved by 17% thanks to the assembly and disassembly of the part with industrial robot systems. The industrial robot system communicates with the CNC as soon as the machining of the part is completed, allowing the new part to be installed. Mounting and dismounting operations can be performed in communication with the CNC without any loss of time. With the communication of objects between the machines, our line has been able to operate fully automatically and efficiently. Break times of 1.5 hours have been eliminated with the fully automatic line. Within the 1 minute cycle time, the time for attaching and removing parts, which takes 15 seconds, has been reduced to 10 seconds. Material waiting times have been eliminated. Work transition times, which cause a loss of 1.5 hours per day, which is 30 minutes on average for each shift, have been reduced by 67%. Total waiting and downtime of the machines was reduced from 3 hours to 1 hour. In this way, in line with the 41% improvement in productivity, the daily production capacity was increased from 585 to 715 units for a single machine. Thus, a 22% increase in production capacity was realized during CNC machining, which is a critical process of our company. All parts are 100% controlled with the fully automatic measurement control system provided in our work. With our project, measurement controls can be carried out fully automatically according to the desired quality standards without any disruption in production. Accordingly, our labor costs have been significantly reduced in the relevant process.

Date: July, 8, 2023.

Key words and phrases. Industrial automation, quality, productivity, smart manufacturing

REFERENCES

- [1] Filippi, E., Bannò, M., & Trento, S. Automation technologies and their impact on employment: A review, synthesis and future research agenda. *Technological Forecasting and Social Change*, 191, 122448, (2023).
- [2] Wewerka, J., & Reichert, M. Robotic process automation-a systematic mapping study and classification framework. *Enterprise Information Systems*, 17(2), 1986862, (2023).
- [3] Asatiani, A., Copeland, O., & Penttinen, E. Deciding on the robotic process automation operating model: A checklist for RPA managers. *Business Horizons*, 66(1), 109-121, (2023).
- [4] Aydın, E. Katılım finansında robotik süreç otomasyonlarının uygulama alanlarının değerlendirilmesi ve otomasyona tabi tutulan süreçlerin maliyet ve süre açısından verimlilik analizi (Master's thesis, İstanbul Sabahattin Zaim Üniversitesi, Sosyal Bilimler Enstitüsü, İslam İktisadi ve Finansı Anabilim Dalı).
- [5] Özdem, H., & Bora, M. P. Türkiye’de Robotik Süreç Otomasyonu. *Bilgisayar Bilimleri ve Teknolojileri Dergisi*, 3(1), 1-9, (2021).
- [6] ÇİRKİN, E., & ÖZDAĞOĞLU, A. Endüstri 4.0 Bünyesindeki Otonom Robotların Sürdürülebilirlik Perspektifleri Açısından Değerlendirilmesi. *Erciyes Akademi*, 35(4), 1534-1553, (2021).
- [7] ŞENDOĞDU, A. A. Endüstri 4.0 devriminde robotik kaynaklar yönetimi bağlamında insan kaynakları yönetiminde yeni açılımların kaçınılmazlığı. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 34(1), 141-161, (2020).

BERDAN CIVATA ENERJİ İMALAT SAVUNMA SANAYİ VE LABORATUVAR HİZMETLERİ TİCARET A.Ş.,
MERSİN, TÜRKİYE
kusat.kahya@berdancivata.com

BERDAN CIVATA ENERJİ İMALAT SAVUNMA SANAYİ VE LABORATUVAR HİZMETLERİ TİCARET A.Ş.,
MERSİN, TÜRKİYE
seren.gecegel@berdancivata.com

BERDAN CIVATA ENERJİ İMALAT SAVUNMA SANAYİ VE LABORATUVAR HİZMETLERİ TİCARET A.Ş.,
MERSİN, TÜRKİYE
seda.yucel@berdancivata.com

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 219

R58-03 APPLICATION IN ALUMINUM CHASSIS

MUSTAFA YILMAZ, TUN ZENGİN, ONUR CAN KIRIT and NECİP AHMET KÖROĞLU

ABSTRACT

Due to the globalization of the world, logistics constitutes an important part of our lives. The importance of the supply chain emerges in any crisis. The consequences of disruptions in the supply chain will be very severe. This harms both users and companies. Apart from this, the safe use of highways is important not only for the supply chain but also for preventing losses in traffic accidents. There are certain conditions to minimize the consequences of these accidents. The procedures for the registration of vehicles following the legislation are called homologation. Technical regulations of vehicles according to United Nations/Economic Commission for Europe (UNECE) are called regulations^[1] The tools used in the supply chain differ according to their shapes. These can be counted as trailers, trucks, dumpers, and tankers. The types of vehicles we will use also vary according to the load we will carry; can be classified as solid, liquid, or gas. The vehicle on which we will develop in this study is an aluminum fuel tanker with a capacity of 40,000 liters. It is about the change made in the rear bumper of the aluminum fuel tanker and the results of this change and the effect of these results on the vehicle. This change had a positive effect on the regulation and vehicle load-carrying capacity. As a test, ANSYS structural static analysis was performed. S355 structural steel and 5083 H111 aluminum alloy were used as the model. The number of points in the model mesh structure was applied as 66983 and the number of elements as 65860. Boundary conditions were applied from the 250mm wide region, starting at 400mm from the midpoint of the force buffer.

REFERENCES

[1]<http://www.armabelgelendirme.com/hizmetlerimiz/icerik/4/tip-onay-belgesi-izmir#:~:text=Onay%20kurulu%C5%9Flar%C4%B1%2C%20tip%20onaylar%C4%B1n%C4%B1%20%E2%80%9CAra%C3%A7,ile%20birlikte%20teknik%20%C3%BCnitelerine%20verilir.>

[2] <https://unece.org/fileadmin/DAM/trans/main/wp29/wp29regs/2017/R058r3e.pdf>

[3] <https://acikerisim.subu.edu.tr/xmlui/bitstream/handle/20.500.14002/1086/690218.pdf?sequence=1&isAllowed=y>

KOLUMAN AUTOMOTIVE, INDURSTY GAZİANTEP UNIVERSITY
E-mail address: mustafa.yilmaz@koluman.com

Date: July, 8, 2023.

Key words and phrases. Aluminum tanker, bumper, aluminum tanker regulation, R58

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 220

A PERFORMANCE ANALYSIS COMPARISON OF MACHINE LEARNING ALGORITHMS IN DETECTION OF HEART DISEASE

BAHAR DEMİRTÜRK and FEKİR CAN TELKENAROĞLU
0000-0002-5901-5190 and 0000-0002-7085-6790

ABSTRACT

Cardiovascular diseases are one of the leading causes of death worldwide. Approximately 31% of deaths in the world are due to these diseases each year. 4 out of 5 deaths from cardiovascular disease are due to heart attacks and strokes. About a third of these deaths occur in people under the age of 70. Heart failure is a common fact caused by cardiovascular diseases.

In this paper, it is aimed to determine the individuals with heart disease beforehand by comparing the performance analysis of some machine learning algorithms. The dataset used in this study has been provided from the website <https://www.kaggle.com/datasets/fedesoriano/heart-failure-prediction>. 5 heart datasets were prepared by combining over 11 common features, making it one of the largest heart disease datasets ever available. Totally 1190 different observations were made from 5 heart datasets, and as a result of these observations, 272 of them were eliminated and a new data set containing a total of 918 data was created. This study is important in terms of early identification of patients at risk of heart disease.

REFERENCES

- [1] M. H. Ali, Heart Diseases Prediction Using WEKA, Journal of Baghdad College of Economic Sciences, 58, 1-12, (2019).
- [2] J. Alzubi, A. Nayyar, and A. Kumar, "Machine learning from theory to algorithms: an overview," Journal of Physics: Conference Series, 1142, (2018).
- [3] M. B. Anton, A. H. M. S. Jamil, M. Mamtaz, M. M. Khan, S. Aljahdali, M. Kaur, P. Singh, and M. Masud, A comparative analysis of machine learning algorithms to predict Alzheimer's disease, Journal of Healthcare Engineering, 1-12, (2021).
- [4] R. Bhardwaj, A.R. Nambiar, D. Nambiar, A Study of Machine Learning in Healthcare. IEEE 41st Annual Computer Software and Applications Conference, 236-241, (2017).
- [5] P. Canbay, Sağlıkta Yapay Zeka: Makine Öğrenmesi Yöntemleri ve Uygulamaları, Akademisyen Kitabevi, İstanbul (2020).
- [6] A. Simon, M. Deo, V. Selvam, and R. Babu, An overview of machine learning and its applications, International Journal of Electrical Sciences and Engineering, 1, 22-24, (2016).

DEPARTMENT OF FUNDAMENTAL SCIENCES, FACULTY OF ENGINEERING AND ARCHITECTURE, İZMİR BAKIRÇAY UNIVERSITY, İZMİR, TURKEY
E-mail address: bahar.demirturk@bakircay.edu.tr

INTELLIGENT SYSTEMS ENGINEERING, GRADUATE EDUCATION INSTITUTE, İZMİR BAKIRÇAY UNIVERSITY, İZMİR, TURKEY

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 62P10; 68P99; 68P10.

Key words and phrases. Heart Disease, Weka Tool, Predicting, Machine learning.

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 221-222

**AUTOMOTIVE INDUSTRY SPARE PARTS STOCK MANAGEMENT ABC ANALYSIS
BASED AHP METHOD APPLICATION**

ELİF İREM KAL^{1*} and EMEL YONTAR¹

0009-2435-1765 and 0000-0001-7800-2960

ABSTRACT

Inventory management plays a critical role in the success of companies. For this reason, stock control and planning of all assets in the production system should be done effectively. Spare part groups are more in number and variety, making stock management even more complicated. For the effective realization of stock management, companies aim to have the right material, in the right quantity, in the right place. The fact that the company has more stock than it needs causes it to bear the cost of overstocking, and the presence of excess stock also affects the useful life of the material. On the contrary, the fact that the enterprises do not have enough stocks causes the company to lose sales and the production line to stop, and thus the company experiences prestige and financial losses. For this reason, in this study, in order to determine the frequency and criticality of materials or parts, in the production of spare parts in the automotive industry, the Analytical Hierarchy Process (AHP) method after ABC analysis was used to determine the consumption rate of the materials, the rate of use, and the importance level according to the cost classification of the material. AHP is a method that can evaluate qualitative and quantitative criteria in decision making and solve complex problems in a hierarchical structure. ABC analysis includes the classification of the materials that make up the stocks according to their importance. By considering the inventory costs and determining the importance and group A classification; with the criteria of preparation times, cost, daily consumption amounts and safety stock amounts, priority spare parts were determined by the AHP method and the effects of these two methods on the stock cost were examined.

Date: July, 8, 2023.

Key words and phrases. Inventory management, ABC analysis, Multi-criteria decision making, AHP method, Spare parts

REFERENCES

- [1] Çekici, H. M. [GGY 430 Yönetim Muhasebesi İlkeleri], <https://acikders.ankara.edu.tr/mod/resource/view.php?id=119684>, (2019).
- [2] Kaloğlu N. Bir Otomotiv Firmasında Yedek Parça Envanter Yönetimi, Dokuz Eylül Üniversitesi. Yüksek Lisans Tezi, (2019).
- [3] Karahaliloğlu M., Bir Otomobil Firmasında Envanter Yönetimi ve Yedek Parça Stoğu Uygulaması, Beykent Üniversitesi, Yüksek Lisans Tezi, (2018).
- [4] Gülçin Ö. Talep belirsizliği altında yedek parça stoklarının yönetimi, İstanbul Teknik Üniversitesi Yüksek Lisans Tezi, (2017).
- [5] Özgür, B. Envanter Yönetimi İçin Maliyet Parametrelerinin Hesaplanması: Otomotiv Sektöründe Bir Uygulama (Doctoral dissertation, Fırat Bilimsel Enstitüsü), (2007).
- [6] Kaya N., Stok Yönetimi Üssad Yayın evi, Erzurum Atatürk Üniversitesi, (2020).
- [7] Tuzkaya, U. R., & İrem, A. K. S. U. Üretimde ara stok yönetim süreçlerinin iyileştirilmesi ve bir uygulama. Beykoz Akademi Dergisi, 1(1), 47-76, (2013).
- [8] Ertuğru, İ., & Tanrıverdi, Y. Stok kontrolde ABC yöntemi ve AHP analizlerinin iplik işletmesine uygulanması. Uluslararası Alanya İşletme Fakültesi Dergisi, 5(1), 41-52, (2013).
- [9] Elif Kalın, Çukurova Üniversitesi-Yedek Parça Stok Yönetiminde Çok Kriterli Karar Verme Metotlarına Dayalı Stok Yönetim Optimizasyon Yaklaşımı, (2019).

¹TARSUS UNIVERSITY, GRADUATE SCHOOL OF EDUCATION, DEPARTMENT OF MECHANICAL ENGINEERING, TARSUS, MERSİN TÜRKİYE
E-mail address: elife_kal@tarsus.edu.tr

²TARSUS UNIVERSITY, FACULTY OF ENGINEERING DEPARTMENT OF INDUSTRIAL ENGINEERING, TARSUS, MERSİN, TÜRKİYE
E-mail address: eyontar@tarsus.edu.tr

EVALUATION OF THE EFFECTS OF VISUAL AND SOMATOSENSORY INPUTS ON BALANCE IN THE ELDERLY BY USING MACHINE LEARNING

Veyse Alcan

0000-0002-7786-8591

ABSTRACT

Decrease or deterioration in both visual and somatosensory inputs in elderly people leads to balance problems that increases the risk of falling. Instability or irregularity of the Center of Pressure (CoP) may be associated with an increased risk of falls. The irregularity in CoP time series can be measured by nonlinear methods rather than linear or statistical approaches. In recent years, Entropy measurements have been used as a very popular method for measuring irregularity and complexity in time series. This study aimed to examine the effect of visual or somatosensory inputs on CoP signal that may be associated with falls in the elderly using machine learning models with entropy-based feature set. A public CoP data of elderly recorded in eyes open-closed on rigid and compliant surface were used. The feature set was extracted by calculated Sample Entropy, Fuzzy Entropy, Distribution Entropy, Conditional Entropy, Permutation Entropy, and Sparse Density Entropy from CoP data. Then, CoP variables were classified by using Support Vector Machines (SVM) and K-Nearest Neighbors (k-NN) algorithms from Machine Learning (ML) models in visual and somatosensory provocation. Classification performances were compared with the confusion matrix (with accuracy, sensitivity, selectivity and precision metrics). When surface conditions were compared, the SVM algorithm showed the best performance with respect to k-NN in both training and testing with 82% and 79% accuracy, respectively. On the other hand, when visual inputs were compared, SVM revealed the best results in training and testing with an accuracy rate of 61% and 63%, respectively. This study indicated that the measurement of CoP irregularity or nonlinear dynamics in balance assessments in the elderly was more sensitive to somatosensory inputs than visual inputs. Consequently, in the elderly, especially in rigid-compliant surface experiments, entropy measurements of CoP signal could be an indicator or biomarker of the falling risk.

REFERENCES

1. Winter DA (1995) Human balance and posture control during standing and walking. *Gait Posture* 3:193-214. [https://doi.org/10.1016/0966-6362\(96\)82849-9](https://doi.org/10.1016/0966-6362(96)82849-9)
2. Alcan V (2022) Nonlinear Analysis of Stride Interval Time Series in Gait Maturation Using Distribution Entropy. *IRBM* 43(4): 309-316. <https://doi.org/10.1016/j.irbm.2021.02.001>
3. Santos DA, Duarte M (2016) A public data set of human balance evaluations. *PeerJ* 4:e2648. <https://doi.org/10.7717/peerj.2648>
4. Rojas F, Niazi IK, Maturana-Russel P, Taylor D (2022) Exploring the Potential of Machine Learning for the Diagnosis of Balance Disorders Based on Centre of Pressure Analyses. *Sensors* 22(23):9200. <https://doi.org/10.3390/s22239200>

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING, TARSUS UNIVERSITY, TARSUS, MERSİN, TÜRKİYE
E-mail address: alcanveysel@tarsus.edu.tr

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. older people, balance, falling risk, entropy, machine learning

THE INFLUENCE OF THE LACTATION PERIOD AND THE TYPE OF MODIFIED MILK ON THE CONTENT OF ESSENTIAL AMINO ACIDS IN HUMAN MILK AND INFANT FORMULA

Aleksandra PURKIEWICZ¹, Kinga LAJKOWSKA², Jacek NOWAKOWSKI³, Renata PIETRZAK-FIEĆKO¹

0000-0002-5065-0381, 0000-0001-9475-2868, 0000-0002-0754-0806

ABSTRACT

It is reported that human milk is a source of nearly 300 proteins with unique functional properties. They are a source of amino acids that have properties that ensure the rapid growth of an infant [1]. The content of total protein in human milk is physiologically determined and is at a similar level in each of the lactating women. However, throughout the lactation period, the content of amino acids in human milk changes, which, together with the growing child's body, perform specific functions [2]. The amino acid composition of modified milk should be composed in such a way that the content of essential amino acids is at least equal to their content in human milk [3]. The aim of the study was to evaluate the content of essential amino acids in human milk in relation to the lactation period and in infant formula intended for infants' first and follow-up feedings.

The research material consisted of samples of breast milk and modified milk from three manufacturers. Breast milk samples were collected from 100 local women currently living in the east-northeast region of Poland. Due to the insufficient number of samples for analysis, analytical tests were carried out on 75 samples of human milk (38 from the first lactation period and 38 from the second lactation period). Additionally, three producers of modified milk meant for infants' first and follow-up feedings were included in the research materials. The analysis of the amino acid content was carried out using the gradient high-performance liquid chromatography technique (HPLC) described by Rynkiewicz et al. [4] with some modifications.

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Breast Milk, Infant Formula, Amino Acid, Infants, Lactation Period

In the analyzed samples of human milk and infant formula, individual essential amino acids were identified: histidine, isoleucine, leucine, tryptophan, phenylalanine, threonine, lysine, valine, and methionine. Breast milk from the second lactation period contained significantly higher amounts of methionine (Mann-Whitney test: $t=-3.947$, $p=0.00008$), leucine (Mann-Whitney test: $t=-2.203$, $p=0.028$), isoleucine (Mann-Whitney test: $t=-2.203$, $p=0.028$), $t=-3.550$, $p=0.0004$) and threonine (Student's t-test: $t=-2.164$, $df=154$; $p=0.032$). The content of histidine, threonine, lysine, and methionine was at a higher level in modified milk compared to human milk ($p\leq 0.05$). In the case of modified milk, the content of amino acids varied depending on the producer and the type of milk (first or follow-up infant formula). The tendency to change the composition of milk in relation to the lactation period is physiologically determined, and the protein content decreases in favor of the fat content, which makes breast milk more energetic as the child grows. The amino acid composition of human milk is regulated throughout the lactation period to perform specific functions in the developing body of the newborn. Producers of modified milk are obliged to compose an appropriate amino acid profile that fully covers the needs of infants for each of the exogenous amino acids [1].

REFERENCES

1. Von Sodenhoff, J.H.J.; Siziba, L.P.; Buchenauer, L.; Mank, M.; Wiertsema, S.P.; Hogenkamp, A.; Stahl, B.; Garssen, J.; Kethenbacher, D.; Genuneit, J. (2021). "Free and total amino acids in human milk in relation to maternal and infant characteristics and infant health outcomes: The Ulm SPATZ health study". *Nutrients*, 13(6).
2. Ulegbu, P.O., Ijeh, I.I. (2013). "Protein and amino acid composition of breast milk of mothers in Umuahia, Urban Nigeria" *European Journal of Experimental Biology*, 3(3), 605-608.
3. Agostoni, C., Carrathu, B., Bonigila, C., Riva, E., Sanzini, E. (2000). "Free amino acid content in standard infant formulas: comparison with human milk" *Journal of the American College of Nutrition*, 19(4), 434-438.
4. Rynkiewicz, J., Skłodowski, M., Chmur, M., Bajguz, A., Roguz, K., Roguz, A., Zych, M. (2020). "Intraspecific variation in nectar chemistry and its implications for insect visitors: the case of the medicinal plant, *Polemonium caeruleum* L." *Nutrients*, 9(10), 1297.

¹ UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN, DEPARTMENT OF COMMODITY SCIENCE AND FOOD ANALYSIS, FACULTY OF FOOD SCIENCE, 10-719 OLSZTYN, POLAND
E-mail address: aleksandra.purkiewicz@uwm.edu.pl, renap@uwm.edu.pl

² UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN, SCHOOL OF PUBLIC HEALTH, COLLEGIUM MEDICUM, 10-719 OLSZTYN, POLAND
E-mail address: kinga.szajkowska@uwm.edu.pl

³ UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN, DEPARTMENT OF ECOLOGY AND ENVIRONMENTAL PROTECTION, FACULTY OF BIOLOGY AND BIOTECHNOLOGY, 10-719 OLSZTYN, POLAND
E-mail address: jacek.nowakowski@uwm.edu.pl

EFFECT OF PRODUCTION METHOD ON SELECTED BIOACTIVE COMPOUNDS AND ANTIOXIDANT ACTIVITY OF JAPANESE QUINCE AND QUINCE FRUIT TINCTURES

Marat N¹., Danowska Oziewicz M¹., Polak-Śliwińska M²., Narwojsz A¹.

0000-0002-0102-0369, 0000-0001-3880-4798, 0000-0001-5425-0804, 0000-0001-7923-6689

ABSTRACT

In Poland, a tincture is a well-known alcoholic beverage defined as a drink consisting of ethanol, herbs, fruits, plant roots and sugar. The traditional method of tinctures production involves macerating fruit in an aqueous ethanol solution for an average of 2 months, depending on the fruit species [Śliwińska et al. 2016; Polak, Bartoszek 2015]. Nowadays, new solutions are being sought to help producers shorten the time of the tincture-making process. One of those solutions could be the use of the *sous vide* technique as an alternative fruit maceration method.

The aim of the study was to evaluate the effect of the maceration method on the content of vitamin C, phenolic compounds and antioxidant activity of tinctures manufactured from Japanese quince and quince fruits. Japanese quince and quince fruit and ethyl alcohol (96%) were purchased at a retail store in Olsztyn. Fruits used for tinctures production were subjected to the traditional maceration, as well as *sous vide* heating at 40 and 60°C using different of ingredients (alcohol or sugar) addition. The tinctures produced were analyzed after 6 months of maturation. The tinctures were evaluated for vitamin C concentration by the HPLC method, total phenolic compounds using Folin-Ciocalteu reagent and antioxidant activity by the DPPH radical method [Singleton and Rossi 1965, Brand-Williams et al. 1995, Gökmen et al. 2000]. The results were subjected to statistical analysis (analysis of variance, Tukey's test, $p < 0.05$).

Based on the results of the study it was observed, that both fruit tinctures produced by the traditional method had a significantly higher concentration of vitamin C compared to those produced by the *sous vide* method. Maceration of fruit by the *sous vide* heating at 40°C method resulted in higher retention of vitamin C in tinctures compared to the *sous vide* 60°C method. Tincture manufactured from Japanese quince fruit by the *sous vide* 60°C method, in which sugar was added to the fruit before ethanol, showed the lowest vitamin C content among that fruit tinctures analyzed. The process of macerating Japanese quince and quince fruit using the *sous vide* method at 40°C and at 60°C with ethanol, resulted in a significant increase in the concentration of total phenolic compounds in the tinctures compared to the traditional method.

At the same time, tinctures prepared from Japanese quince and quince fruits macerated using *sous vide* at 60°C in ethanol showed a higher concentration of total phenolic compounds compared to tinctures produced by the *sous vide* method at 40°C. The highest and comparable antioxidant activity in the group of Japanese quince tinctures, was noted for traditionally and *sous vide* at 60°C in ethanol macerated beverages, while in the group of quince tinctures the highest antioxidant properties were observed for the tincture manufactured by the *sous vide* method at 40°C. Both fruit tinctures produced by macerating fruit in sugar (*sous vide* 60°C) showed the lowest antioxidant activity in their respective groups of tinctures.

The temperature of maceration and maceration medium (ethanol or sugar) showed a significant effect on the content of the bioactive compounds studied and the antioxidant activity of the tinctures. It seems, that fruits maceration with the use of the *sous vide* method is a good alternative to macerating fruits by the traditional method due to the shorter time of the tincture-making process. In addition, the increase in maceration temperature resulted in a higher concentration of phenolic compounds and a favorable antioxidant activity of fruit tinctures. The 60°C *sous vide* method seems to be superior to the 40°C *sous vide* method due to the higher concentration of phenolic compounds and better antioxidant activity. The method of maceration of fruits in sugar at 60°C appeared to be the weakest in terms of the parameters tested. The possibility of using different temperatures and the raw materials addition at the maceration stage are apparently important for developing new methods of tincture production that will be beneficial in terms of bioactive components and antioxidant activity.

REFERENCES

- 1-Śliwińska, M.; Wiśniewska, P.; Dymowski, T.; Wąsdencki, W.; Namieśnik, J. Application of Electronic Nose Based on Fast GC for Authenticity Assessment of Polish Homemade Liqueurs Called Nalewka. *Food Anal Methods*, 2016, 9: 2670-2681.
- 2-Polak, J.; Bartoszek, M. The study of antioxidant capacity of varieties of nalewka, a traditional Polish fruit liqueur, using EPR, NMR and UV-vis spectroscopy. *J Food Compos Anal*, 2015, 40: 114-119.
- 3-Brand-Williams, W.; Cuvelier, M.E.; Berset, C. Use of free radical method to evaluate antioxidant activity. *LWT – Food Sci Technol*, 1995, 28, 25-30.
- 4-Gökmen V., Akhraman N., Demir N., Acar J., 2000. Enzymatically validated liquid chromatographic method for the determination of ascorbic and dehydroascorbic acids in fruit and vegetables. *J Chromatogr A*, 881(1-2): 309-316.

¹DEPARTMENT OF HUMAN NUTRITION, FACULTY OF FOOD SCIENCES, UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN, POLAND

E-mail address: natalia.marat@uwm.edu.pl, marzena.danowska@uwm.edu.pl, agnieszka.narwojsz@uwm.edu.pl

²DEPARTMENT OF COMMODITY SCIENCE AND FOOD ANALYSIS, FACULTY OF FOOD SCIENCES, UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN, POLAND

E-mail address: magdalena.polak78@gmail.com

DETERMINATION OF PRIORITY AREAS FOR A POSSIBLE UNDERGROUND DAM AROUND THE HARŞİT STREAM BASIN

Gümüşhane Bölge BC ZKUŞ, Dr. Yusuf KAYA

0009-0008-7989-4022, 0000-0002-1894-1146

ABSTRACT

There is a need for efficient use of water resources worldwide due to factors such as drought, climate change, increasing world population, and high urbanization rate. Therefore, it is necessary to use renewable energy sources for sustainable water resources. The negative effects of evaporation losses of above-ground dams have increased the need for underground dams. Underground dams increase the reserve volume by storing water with minimum leakage and allow future generations to benefit. Unlike other types of dams, it is an interesting topic for academic studies due to its long life and low cost. By considering the 9 parameters (drainage density, land use, land slope, precipitation parameter, permeability, flow length, main tributary density, population density, distance to the fault line) used in this study, Gümüşhane is the arid and largest basin in the Eastern Black Sea Region. Since there is a need for water use in the Harşit basin covering the province, it is aimed to determine a suitable location for the underground dam with the help of GIS (geographic information system) in these sections. In determining the position, the most negative value of "0" and the most positive value of "100" were assigned, and thus all parameters were provided to take values on a common scale (0-100). In addition, areas with environmental, economic, technical and social restrictions were determined as unsuitable areas and were excluded from the study area. As a result of this study, Gümüşhane, Kürtün, Torul, Doğan kent regions were determined as the most suitable areas for the construction of an underground dam.

REFERENCES

- 1- Apaydın, A., (2014). Underground Dams from Site Selection to Operation, *DSİ Yayınları*, (in Turkish).
- 2- Apaydın, A., Demirci Aktaş, S., Kaya, S., (2014). Alternative Proposal for Combating Drought in the Central Anatolia Region: Underground Dams. *İklim Değişikliği ve Çevre*, 2 (1), 13-25 Mart (in Turkish).
- 3- Apaydın, A., Demirci Aktaş, S., Kaya, S., (2009a). Underground Water Storage: Underground Dams, Blue Planet, *Popüler Yerbilim Dergisi*, TMMOB Jeoloji Mühendisleri Odası yayını, 14, 44-53 (in Turkish).
- 4- Ali, E., Doğan, A., (2017). Modeling of Büyük Cırcıp Groundwater Recharge Dam using HYDRUS-1D, *European Journal of Science and Technology*, 7, 11, 7-17.

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Dam, Geographic information system, Appropriate site selection, Underground dam.

- 5- Ebrahimi, J., Moradi, H. R., & Chezgi, J., (2021). Prioritizing suitable locations for underground dam construction in south-east of Bushehr Province, *Environmental Earth Sciences*, 80, 1-16.
- 6- Apaydın, A., Demirci Aktaş, S., Kaya S., (2015). Recent Developments on Groundwater Dams in the Ankara-Çankırı-Çorum Region, *MÜHJEO'2015 National Symposium on Engineering Geology*, 3, September 2015, Trabzon, 397-404.
- 7- Dehghani Bidgoli, R., Koohbanani, H., (2021). Site selection for underground dam construction by fuzzy algorithm in GIS platform. *ECOPERSIA*, 9(3), 159-168.
- 8- Çınar, T., Özdiç, H., (2006). Water Management: Criticism of Global Policies and Practices, *Memleket Yayınları*, Ankara (in Turkish).
- 9- DPT, (2006). Ninth Development Plan (2007 – 2013) Use and Management of Soil and Water Resources, *Özel İhtisas Komisyonu Raporu* (in Turkish).
- 10- Esenyel, Ö, (2001). Water Potential of Turkey and Utilization of Water Potential, *Harp Akademileri Basımevi*, İstanbul.
- 11- Ishida, S., Tsuchihara, T., Yoshimoto, S., Imaizumi, M., (2011). Sustainable Use of Groundwater with Underground Dams, *JARQ* 45 (1), 51 – 61.
- 12- İlhan, A., (2011). Towards a New Water Policy Water Management in Turkey, Alternatives and Suggestions, *Sosyal Değişim Derneği, 1. Baskı*, İstanbul (in Turkish).
- 13- Kapan, İ., (2007). Is Water Wars Awaiting the World? Strategic Waves of Water, *Babiali Kültür Yayıncılığı*, İstanbul (in Turkish).
- 14- Talebi, A., Zahedi, E., Hassan, M. A., Jassani, M. T., (2019). Locating Suitable Sites for the Construction of Underground Dams Using the Subsurface Flow Simulation (SWAT Model) and Analytical Network Process (ANP)(case study: Daroongar Watershed, Iran). *Sustainable water resources management*, 5, 1369-1378.

GÜMÜŞHANE UNIVERSITY, 29100, GÜMÜŞHANE, TÜRKİYE
tubabzks98@gmail.com

GÜMÜŞHANE UNIVERSITY, 29100, GÜMÜŞHANE, TÜRKİYE
yusufkay_@gumushane.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 230-231

**NONLINEAR DIFFERENTIAL EQUATIONS ACCORDING TO THE BISHOP
PARALLEL TRANSPORT FRAME**

Fatma BULUT

0000-0002-7684-6796

ABSTRACT

Bishop created a curve-specific alternative to Frenet's frame and named it Bishop frame. It is known that for a given constant vector field concerning Bishop parallel transport frame $\{T, M_1, M_2, M_3\}$, there are no $(1, k)$ -type slant helices for $1 \leq k \leq 4$ in [23]. The aim of this paper nonlinear differential equations according to Bishop parallel transport frame $\{T, M_1, M_2, M_3\}$, for (k, m) -type slant helices (2,3)-, (2,4)-, and (3,4)-type slant helices in 4-dimensional Euclidean space. It then provides characterizations of (k, m) -type slant helices in accordance with the Bishop parallel transport frame in 4-dimensional Euclidean space.

REFERENCES

- [1] N. Takeuchi, S. İzumiya, *New Special Curves and Developable Surfaces*, Turkish Journal of Mathematics (28) 153-163, (2004).
- [2] E. Ziplar, A. Şenol, Y. Yaylı, *On Darboux Helices in Euclidean 3-Space*, Global Journal of Science Frontier Research: (F) Mathematics and Decision 12 (13) ,73-80, (2012).
- [3] K. İlarıslan, M. Yıldırım, *On Darboux Helices in Euclidean 4-Space*, Mathematical Methods in the Applied Sciences 42 (16) 5184-5189, (2018).
- [4] Y. Forterre, J. Duamaj, *Generating Helices in Nature*, Science 333 (6050) 1715-1716, (2011).
- [5] L. Kula, N. Ekmekci, Y. Yaylı, *Characterizations of Slant Helices in Euclidean 3-Space*, Turkish Journal of Mathematics (33) 1-13, (2009).
- [6] X. Yang, *High Accuracy Approximation of Helices by Quintic Curve*, Computer Aided Geometric Design (20) 303-317, (2003).
- [7] R. L. Bishop, *There is No More Than One Way to Frame a Curve*, Mathematical 82 (3) 246-251, (1975).

Date: July, 8, 2023.

2000 Mathematics Subject Classification. 14H50, 53A04

Key words and phrases. Helix, slant helix, type-3 Bishop frame, (k, m) -type slant helix.

[8] B. Körpınar, *On Characterization Inextensible Flows of Curves According to Bishop Frame in E^3* , Revista Notas de Matematica 7 (32) 37-45, (2011).

[9] B. Bükcü, M. K. Karacan, *The Slant Helices According to Bishop Frame*, International Scholarly and Scientific Research & Innovation 3 (11) 1010-1013, (2009).

[10] S. Yılmaz, E. Özyılmaz, M. Turgut, *New Spherical Indicatrix and Their Characterizations*, Analele Stiintifice ale Universitatii Ovidius Constanta 18 (2) 337-354, (2010).

[11] N. Macit, M. Düldül, *Some New Associated Curves of a Frenet Curve in E^3 and E^4* , Turkish Journal of Mathematics (38) 1023-1037, (2014).

[12] S. Buyukkutuk, G. Öztürk, *Constant Curvature Curves According to Parallel Transport Frame in Euclidean 4-space E^4* , New Trends in Mathematica Sci 3 (4) 161-170, (2015).

[13] M. Elzawy, *Smarandache Curves in Euclidean 4-Space*, Journal of the Egyptian Mathematical Society 25 (3) 268-271, (2017).

[14] J. H. Choi, Y. P. Kim, *Associated Curves of a Frenet Curve and Their Applications*, Applied Mathematics and Computation 218 (18) 9116-9124, (2012).

[15] T. Kömünel, M. T. Saraydın, *Associated Curves According to Bishop Frame in Euclidean 3-Space*, Advanced Modeling and Simulation 15 (3) 713-717, (2013).

[16] F. Bulut, *Slant Helices of (k, m) -Type According to the ED-frame in Minkowski 4-Space*, Symmetry 13 (11) 2185, (2021).

[17] F. Bulut, *Special Helices on Equiform Differential Geometry of Timelike Curves in E_1^4* , Cumhuriyet Science Journal 42 (4) 906-915, (2021).

[18] F. Bulut, F. Tartık, *(k, m) -type Slant Helices According to Parallel Transport Frame in Euclidean 4- Space*, Turkish Journal of Mathematics and Computer Science 13 (2) 261-269, (2021).

[19] M. Y. Yıldırım, M. Bektaş, *Slant Helices of (k, m) -type in E^4* , Acta Universitatis Sapientiae Mathematica (10) 395-401, (2018).

[20] Z. Özdemir, İ. Gök, N. Ekmekci, Y. Yaylı, *A New Approach on Type-3 Slant Helices in E^4* , General Mathematics Notes 28 (1) 40-49, (2015).

[21] Y. Ünlütürk, H. Tozak, C. Ekici, *On k -Type Slant Helices Due to Bishop Frame in Euclidean 4-Space*, International Journal of Combinatorics (1) 1-9, (2020).

[22] Ç. Camcı, H. H. Hacısalihoğlu, İ. Gök, *V_n -Slant Helices in Euclidean n -Space*, Mathematical Communications 2 (14) 317-329, (2009).

[23] G. Cihangir, *On Type-3 Slant Helices Due to Bishop Frame in Euclidean 4-Space*, Master's Thesis, Firat University Elazığ, (2022).

[24] F. Gökçelik, Z. Bozkurt, I. Gök, F. N. Ekmekci, Y. Yaylı, *Parallel Transport Frame in 4- dimensional Euclidean Space E^4* , Caspian J. of Math. Sci. 3(1) 91-102, (2014).

DEPARTMENT OF MATHEMATICS, FACULTY OF ARTS AND SCIENCES, BİTLİS EREN UNIVERSITY, BİTLİS,
TÜRKİYE
E-mail address: fbulut@beu.edu.tr

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 232

NUMERICAL SOLUTIONS OF CONFORMABLE TIME-FRACTIONAL KLEIN-GORDON EQUATION WITH PROPORTIONAL DELAY BY THE NOVEL METHOD

HALİL ANAÇ

ABSTRACT

The conformable fractional q -Shehu homotopy analysis transform method are utilized to examine the conformable time-fractional Klein-Gordon equations with proportional delay. The graphs of the numerical solutions to this problem are plotted in Maple software. Numerical simulations show that the suggested method is successful and consistent.

REFERENCES

- [1] Liouville J., Mémoire sur quelques questions de géométrie et de mécanique, et sur un nouveau genre de calcul pour résoudre ces questions, Ecole polytechnique, 13, 71-162, (1832).
- [2] Riemann GFB, Versuch einer allgemeinen Auffassung der Integration und Differentiation, Leipzig, Germany, Gesammelte Mathematische Werke, (1896).
- [3] Capriz M., Elasticità e Dissipazione, Bologna, Italy, Zanichelli, (1969).
- [4] Miller K., Ross B., An Introduction to Fractional Calculus and Fractional Differential Equations, New York, NY, USA, Wiley, (1993).

DEPARTMENT OF COMPUTER TECHNOLOGY, TORUL VOCATIONAL SCHOOL, GÜMÜŞHANE UNIVERSITY,
GÜMÜŞHANE, TURKEY

E-mail address: halilanac0638@gmail.com

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Conformable time-fractional Klein-Gordon equation, conformable fractional q -Shehu homotopy analysis transform method, conformable fractional Shehu transform.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 233

FAULTS AND SUGGESTIONS DETECTED IN DISTRIBUTION PANEL AND TRANSFORMERS IN POWER PLANTS

Hale Bakır

0000-0001-5580-0505

ABSTRACT

The demand for the widespread use of solar power plants in Turkey with full efficiency is increasing day by day. Panel failures, transformer failures, such as panel failures, are among the failures that affect the efficiency. Maintenance and thermal imaging are often required if full efficiency in power generation from a solar power plant is desired. Thermal imaging methods are both fast and highly accurate in detecting faults. In this study, faults in distribution panels and transformers were detected in a power plant with thermal imaging technique and solution suggestions were presented.

REFERENCES

- [1] A. Z. Aobasi, Fault detection and diagnosis in power transformers: a comprehensive review and classification of publications and methods, *Electric Power Systems Research*, 209, 2022, 107990, <https://doi.org/10.1016/j.epsr.2022.107990>.
- [2] N. Yadaiah and N. Ravi, Fault Detection Techniques for Power Transformers, *IEEE/IAS Industrial & Commercial Power Systems Technical Conference*, Edmonton, AB, Canada, 2007, 1-9, <https://doi.org/10.1109/ICPS.2007.4292099>.
- [3] S.H. Asman, N.F. Ab Aziz, U.A. Ungku Amirulddin, M.Z.A. Ab Kadir, Transient Fault Detection and Location in Power Distribution Network: A Review of Current Practices and Challenges in Malaysia, *Energies*, 14, 2021, 2988, <https://doi.org/10.3390/en14112988>

DEPARTMENT OF ELECTRONICS AND AUTOMATION, SIVAS CUMHURİYET ÜNİVERSİTESİ, SIVAS, TURKEY
E-mail address:halebakir@cumhuriyet.edu.tr

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Thermal imaging, efficiency, transformer failures, panel failure

EVALUATION OF ENVIRONMENTAL, SOCIAL AND ECONOMIC PERFORMANCES OF 81 PROVINCES OF TURKEY WITH DATA ENVELOPMENT ANALYSIS

GÖKÇEN BAYRAM, AYŞE HANDE EROL BİNGÜLER, GÜLTEKİN ÇETİNER

0000-0001-8891-1010, 0000-0001-9112-0013, 0000-0001-7932-1023

ABSTRACT

In this paper, we aimed to examine the 81 provinces of Turkey in terms of environmental, social and economic aspects and to shed light on current problems. As a result of the industrial revolutions, the rate of urbanization and the urban population has increased rapidly throughout the world. As a result of intense migration from rural to urban areas, the need for shelter and housing has emerged. Every new building built, every new road opened for transportation has affected the nature and ecology of the city. However, as the rate of urbanization increased, cities showed improvements in areas such as health, education and finance. This situation has led people living in the countryside, who are deprived of health and education services, towards city life. Urbanization has taken place very quickly in Turkey, and imbalances have occurred in the country's urban population and urbanization rates. Especially Istanbul has grown very fast compared to other developed cities. As Turkey's most populous city, approximately one-fifth of the country's population lives in Istanbul. The uneven distribution of population and employment and rapid urbanization cause various problems in social, environmental and economic dimensions. Environmental, social and economic indicators selected for analysis were evaluated with data envelopment analysis. Data Environmental Analysis Program (DEAP) 2.1 package program was used to analyze the activities of 81 provinces in line with the determined indicators. As a result of the study, the environmental, social and economic efficiency of 81 provinces was evaluated in line with the indicators. Based on the results, suggestions and discussion areas that can guide other studies have been put forward.

REFERENCES

- [1] Marshall, E., & Shortle, J. (2005). Using DEA and VEA to evaluate quality of life in the Mid-Atlantic states. *Agricultural and Resource Economics Review*, 34(2), 185-203.
- [2] Siong, H. C., & Hussein, M. Z. S. M. (2008). Modeling urban quality of life with data envelopment analysis methods. *Research Result Report*. Universiti Teknologi Malaysia, VOT78513.
- [3] Sueyoshi, T., & Goto, M., (2011). Measurement of returns to scale for DEA based operational and environmental assessment: How to manage desirable (good) and undesirable (bad) outputs?, *European Journal of Operational Research*, 211:76-89

MARMARA UNIVERSITY, DEPARTMENT OF INDUSTRIAL ENGINEERING, 34854, İSTANBUL, TÜRKİYE
gknbayram85@gmail.com

MARMARA UNIVERSITY, DEPARTMENT OF INDUSTRIAL ENGINEERING, 34854, İSTANBUL, TÜRKİYE
hande.erol@marmara.edu.tr

MARMARA UNIVERSITY, DEPARTMENT OF INDUSTRIAL ENGINEERING, 34854, İSTANBUL, TÜRKİYE
gultekin.cetiner@marmara.edu.tr

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases Data Envelopment Analysis, Ecology, Economy, Environmental Performance

MICROWAVE ENERGY-BASED HYBRID NANOMATERIAL PREPARATION APPROACH FOR ENERGY STORAGE PURPOSES

SELÇUK POYRAZ

0000-0003-4260-4948

ABSTRACT

A promising electrochemical energy storage material is prepared based on carbonized conducting polymer (cCP) such as polypyrrole (cPPy) nanoparticles (NPs) with concurrently grown carbon nanotubes (CNTs) and metal oxide nanowires (MONWs) on its surface. Both the preparation of this novel hybrid nanomaterial (HNM), and the tackling of commonly encountered conventional synthesis difficulties were accomplished systematically by combining an in-situ polymerization/coating method with a modified version of the PopTube, ex-situ microwave (MW) energy-based technique, which has proven to be well-established, facile and rapid. By using this highly efficient and easily scalable combined preparation approach, targeted HNMs can be produced in a cost-effective manner, with distinct features of morphology (SEM/TEM), elemental (EDX), spectroscopic (XRD, Raman) and electrochemistry (CV), all of which are substantially backed by material characterization tests and the literature evidence, as well. Consequently, it is expected that this combined approach can provide cPPy NPs decorated with CNTs and MONWs, with the potential to be a preferred material in near future for its aforementioned use.

REFERENCES

1. Liu, Y., Zhang, X.Y., Poyraz, S., Zhang, C., Xin, J.H. (2018). One-step synthesis of multifunctional zinc-iron-oxide hybrid carbon nanowires by chemical fusion for supercapacitors and interfacial water marbles. *ChemNanoMat*, 4: 546–556. <https://doi.org/10.1002/cnma.201800075>
2. Poyraz, S., Cook, J., Liu, Z., Zhang, L., Nautiyal, A., Hohmann, B., Klamt, S., Zhang, X.Y. (2018). Microwave energy-based manufacturing of hollow carbon nanospheres decorated with carbon nanotubes or metal oxide nanowires. *Journal of Materials Science*, 53: 12178–12189. <https://doi.org/10.1007/s10853-018-2511-1>
3. Xie, H., Poyraz, S., Thu, M., Liu, Y., Snyder, E.Y., Smith, J.W., Zhang, X.Y. (2014). Microwave-assisted fabrication of carbon nanotubes decorated polymeric nano-medical platforms for simultaneous drug delivery and magnetic resonance imaging. *RSC Advances*, 4: 5649–5652. <https://doi.org/10.1039/C3RA45913F>
4. Liu, Z., Wang, J.L., Kushvaha, V., Poyraz, S., Tippur, H., Park, S.Y., Kim, M., Liu, Y., Bar, J., Chen, H., Zhang, X.Y. (2011). Poptube approach for ultrafast carbon nanotube growth. *Chemical Communications*, 47: 9912–9914. <https://doi.org/10.1039/C1CC13359D>
5. Liu, Z., Zhang, L., Poyraz, S., Smith, J., Kushvaha, V., Tippur, H., Zhang, X.Y. (2014). An ultrafast microwave approach towards multicomponent and multi-dimensional nanomaterials. *RSC Advances*, 4: 9308–9313. <https://doi.org/10.1039/C3RA47086E>
6. Poyraz, S., Liu, Z., Liu, Y., Zhang, X.Y. (2013). Devulcanization of scrap ground tire rubber and successive carbon nanotube growth by microwave irradiation. *Current Organic Chemistry*, 17: 2243–2248. <https://doi.org/10.2174/13852728113179990049>
7. Poyraz, S., Zhang, L., Schroder, A., Zhang, X.Y. (2015). Ultrafast microwave welding/reinforcing approach at the interface of thermoplastic materials. *ACS Applied Materials & Interfaces*, 7: 22469–22477. <https://doi.org/10.1021/acsami.5b06484>
8. Liu, Z., Chen, L., Zhang, L., Poyraz, S., Guo, Z.H., Zhang, X.Y., Zhu, J.H. (2014). Ultrafast Cr(VI) removal from polluted water by microwave synthesized iron oxide submicron wires. *Chemical Communications*, 50: 8036–8039. <https://doi.org/10.1039/c4cc02517b>

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. carbon nanotube, conducting polymer, electrochemical energy storage, metal oxide nanowire, microwave energy

9. Liu, Z., Liu, Y., Poyraz, S., Zhang, X.Y. (2011). Green-nano approach to nanostructured polypyrrole. *Chemical Communications*, 47: 4421–4423. <https://doi.org/10.1039/C1CC10208C>
10. Liu, Z., Zhang, X.Y., Poyraz, S., Surwade, S.P., Manohar, S.K. (2016). Oxidative template for conducting polymer nanoclips. *Journal of the American Chemical Society*, 132: 13158–13159. <https://doi.org/10.1021/ja105966c>
11. Poyraz, S., Fogel, M., Liu, Z., Zhang, X.Y. (2017). Microwave energy assisted carbonization of nanostructured conducting polymers for their potential use in energy storage applications. *Pure and Applied Chemistry*, 89: 173–182. <https://doi.org/10.1515/pac-2016-1109>
12. Liu, Z., Zhang, L., Wang, R.G., Poyraz, S., Cook, J., Bozack, M.J., Das, S., Zhang, X.Y., Hu, L.B. (2016). Ultrafast microwave nano-manufacturing of fullerene-like metal chalcogenides. *Scientific Reports*, 6: 22503–22510. <https://doi.org/10.1038/srep22503>
13. Poyraz, S. (2020). One-step preparation and characterization of a nanostructured hybrid electrode material via a microwave energy-based approach. *New Journal of Chemistry*, 44: 10592–10603. <https://doi.org/10.1039/D0NJ00604A>

DEPARTMENT OF TEXTILE ENGINEERING, FACULTY OF ENGINEERING, ADIYAMAN UNIVERSITY, ADIYAMAN 02040, TURKEY
E-mail address: spoyraz@adiyaman.edu.tr

MULTI-OBJECTIVE OPTIMIZATIONS of CIRCULAR and SQUARE DUCTS UNDER LAMINAR FLOW and CONSTANT WALL TEMPERATURE CONDITIONS

MUHAMMET NASIF KURU

0000-0002-5941-1221

ABSTRACT

Optimum parameters of ducts having different cross-sections (circular and square) are explored using multi-objective optimization algorithms in this study. Heat transfer and fluid flow analysis of ducts are done with finite volume method. The flow is assumed as steady, incompressible and laminar. Three different multi-objective problems are investigated for each cross-section, i.e. (1) maximization of heat transfer (\dot{Q}) and minimization of pressure drop (ΔP), (2) maximization of heat transfer (\dot{Q}) and minimization of entropy generation (\dot{S}_{gen}), (3) minimizations of volume (V) and pumping power (\dot{W}_{pump}). Air is used as a working fluid, inlet and wall temperatures are given and constant. Each optimization problem constrained with a maximum duct length. Three optimization variables are used which are hydraulic diameter (D_h), duct length (L) and inlet velocity (V_{in}). Optimum parameters of different multi-objective optimization problems are obtained and comparisons are done in detail. The effect of optimization variables on the objective functions are also discussed. It can be inferred that optimum parameters of ducts (circular and square) can be determined according to the design objectives. Moreover, optimum parameters differ from each other.

REFERENCES

- [1] N. Tokgoz, M.M. Aksoy, B. Sahin, Investigation of flow characteristics and heat transfer enhancement of corrugated duct geometries, *Appl. Therm. Eng.* 118 (2017) 518–530. <https://doi.org/10.1016/j.applthermaleng.2017.03.013>.
- [2] N. Tokgoz, B. Sahin, Experimental studies of flow characteristics in corrugated ducts, *Int. Commun. Heat Mass Transf.* 104 (2019) 41–50. <https://doi.org/10.1016/j.icheatmasstransfer.2019.03.003>.
- [3] A. Yilmaz, Minimum entropy generation for laminar flow at constant wall temperature in a circular duct for optimum design, *Heat Mass Transf. Und Stoffuebertragung*, 45 (2009) 1415–1421. <https://doi.org/10.1007/s00231-009-0519-4>.
- [4] A. Yilmaz, O. Büyükalaca, T. Yilmaz, Optimum shape and dimensions of ducts for convective heat transfer in laminar flow at constant wall temperature, *Int. J. Heat Mass Transf.* 43 (2000) 767–775. [https://doi.org/10.1016/S0017-9310\(99\)00189-1](https://doi.org/10.1016/S0017-9310(99)00189-1).
- [5] I. Kotcioglu, A. Cansiz, M. Nasiri Khalaji, Experimental investigation for optimization of design parameters in a rectangular duct with plate-fins heat exchanger by Taguchi method, *Appl. Therm. Eng.* 50 (2013) 604–613. <https://doi.org/10.1016/j.applthermaleng.2012.05.036>.
- [6] M.N. Khalaji, F. Afshari, Experimental and Numerical Investigation of Heat Transfer in Different Winglet-Surface in a Vertical Rectangular Duct, 2 (2018) 16–24.
- [7] S. V. Patankar, C.H. Liu, E.M. Sparrow, Fully developed flow and heat transfer in ducts having streamwise-periodic variations of cross-sectional area, *J. Heat Transfer*, 99 (1977) 180–186. <https://doi.org/10.1115/1.3450666>.
- [8] A. Akcayoglu, C. Nazli, A Comprehensive Numerical Study on Thermohydraulic Performance of Fluid Flow in Triangular Ducts with Delta-Winglet Vortex Generators, *Heat Transf. Eng.* 39 (2018) 107–119. <https://doi.org/10.1080/01457632.2017.1288046>.

TARSUS UNIVERSITY, VOCATIONAL SCHOOL OF TECHNICAL SCIENCES AT MERSIN TARSUS ORGANIZED INDUSTRIAL ZONE, MACHINERY PROGRAM, 33400, TARSUS/MERSIN, TURKEY
Email address, mnasifkuru@tarsus.edu.tr

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Multi-objective optimization, circular and square ducts, laminar flow.

COMPARISON OF REACTIVITY FEEDBACK COEFFICIENTS OBTAINED FROM MCNP6.2 AND SERPENT MONTE CARLO CODES

ELİF AHSEN BAŞTUĞ and BAHRAM R. MALEKİ

0009-0003-6922-3376

ABSTRACT

Fuel (Doppler) and moderator reactivity coefficients that are important for nuclear reactor reliability are calculated using different reactivity Monte Carlo codes and different cross section libraries. In the unit-cell reference study of the Pressure Water Reactor, the Doppler reactivity coefficient was calculated using the code MCNP 6.2. In this study, Doppler reactivity feedback coefficient was obtained using the SERPENT-2 Monte Carlo Simulation code and ENDF-VII and JEFF-3.1.1 libraries, taking into account fuels with different enrichments. It was observed that the results obtained were in line with the reference study results. In addition - in the case of HFP operation, the moderator temperatures were obtained by taking 560K and 600K respectively, with the decelerator reactivity coefficient ENDF/B-VII and JEFF-3.1.1 libraries as -29.56 and -30.03 [pcm/k] respectively.

REFERENCES

- [1] Weaver, K.D. and Zhao, X. and Pilat, E.E. and Herjzlar, P., 2000: A PWR Thorium Pin Cell Burnup Benchmark
- [2] Pereira, F.M.G., 2019: A THORIUM-FUEL PIN NEUTRONIC ANALYSIS USING DIFFERENT NUCLEAR CODES, Belo Horizonte - MG
- [3] Lamarsh, J.R. and Baratta, A.J. 1965. Introduction To Nuclear Engineering. Pearson Education Inc., NJ 07458 USA, 783 s.
- [4] Raymond, L.M. and Holbert, K.E. 1920. Nuclear Energy. Butterworth-Heinemann, USA
- [5] Kazimi S.M., Todreas E.N., 1976, Nuclear Systems-I Thermal Hydraulic Fundamentals, CRC Press, United States of America
- [6] Ashley S.F., Lindley B.A., Parks G.T., Nuttall W.J., Greeg R., Hesketh K.W., Kannan U., Krishnani P.D., Singh B., Thatur A., Cowpar M., Talamo A., "Fuel cycle modelling of open cycle thorium-fuelled nuclear energy systems", Annals of Nuclear Energy 26 (2014) 314-300
- [7] Russel D., Laurance D., "Benchmark Calculations for the Doppler Coefficient of Reactivity", S. Levy Incorporated, 3425 South Bascom Avenue, Campbell, California 95008
- [8] Zain J., Hajjaji O., Bardouni T., Lahdor M., Mira M., Satti H., Yaakobi H., "Benchmark Comparisons of OpenMC and DRAGON5 Codes for Calculating the Doppler Coefficient of Reactivity"

SİNOP UNIVERSITY, SİNOP, TÜRKİYE

E-mail address: ahsen3030@gmail.com

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. SERPENT-2, MCNP 6.2, Monte Carlo Simulation, Reactivity Feedback Coefficients, Temperatures, Fuel (Doppler) Reactivity Coefficients, Moderator Reactivity Coefficients

THE EFFECTS OF CYLINDRICAL AND PARTIAL PIN FINS ON THE COOLING PERFORMANCE OF A MINICHANNEL HEAT SINK

DONDU NUR TURK, KAYHAN DAGIDIR, BUĞRA SARPER and ORHAN AYDIN
0009-0004-4144-5361, 0000-0002-5499-1764, 0000-0001-7554-6575 and 0000-0002-2492-8212

ABSTRACT

In this paper, the effects of cylindrical and partial pin fins within the flow domain on the cooling performance of a liquid-cooled minichannel heat sink are investigated numerically. For this purpose, studies are carried out for four different pin fin configurations between the flow rates of 0.002625 kg/s and 0.0045 kg/s. These configurations include in-line and staggered arrays of cylindrical and partial pin fins. Numerical studies are carried out via ANSYS Fluent software. As a result of the numerical analysis, it is predicted that the discussed configurations will significantly improve the convective heat transfer from the minichannel heat sink.

REFERENCES

- [1] Imran, A.A., Mahmoud, N.S., Jaffal, H.M., Numerical And Experimental Investigation Of Heat Transfer In Liquid Cooling Serpentine Mini-Channel Heat Sink With Different New Configuration Models,6 (), 128-139,(2018).
- [2] Mahmoud, N.S., Jaffal, H.M., Imran, A.A., Performance Evaluation Of Serpentine And Multi-Channel Heat Sinks Based On Energy And Exergy Analyses, Applied Thermal Engineering, (2021).
- [3] Mahmood, H., Freegah, B., Investigating The Effect Of Counter Flow Formation, Ribs And Dimples On The Hydrothermal Performance Of The Serpentine Mini-Channel Heat Sink (Smchs), (2022).
- [4] Ghadhban, F.N., Jaffal, H.M., Numerical Investigation On Heat Transfer And Fluid Flow In A Multi-Minichannel Heat Sink: Effect Of Channel Configurations, Results In Engineering, (2023).

FARBA OTOMOTIV A.Ş. 41420 KOCAELI, TURKEY
E-mail address: dondu.turk@farba.com.tr

DEPARTMENT OF MECHANICAL ENGINEERING, FACULTY OF ENGINEERING, MERSIN, TURKEY
E-mail address: bugrasarper@tarsus.edu.tr

DEPARTMENT OF MECHANICAL ENGINEERING, FACULTY OF ENGINEERING, MERSIN, TURKEY
E-mail address: kayhandagidir@tarsus.edu.tr

DEPARTMENT OF MECHANICAL ENGINEERING, FACULTY OF ENGINEERING, TRABZON, TURKEY
E-mail address: oyadin@ktu.edu.tr

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Minichannel heat sink, Nusselt number, friction factor, thermal enhancement factor

(α, β) -INTERVAL VALUED INTUITIONISTIC FUZZY SUBGROUPS

ARIF BAL and GÖKHAN ÇUVALCIOĞLU

0000-0003-4386-7411 and 0000-0001-5451-3336

ABSTRACT

In this study, the definition of (α, β) -interval valued intuitionistic fuzzy subgroup is given. The concept of (α, β) -interval valued intuitionistic fuzzy subgroup is constructed on (α, β) -interval valued intuitionistic fuzzy sets which were defined by Bal, Çuvalcıoğlu and Altıncı in 2023. (α, β) -interval valued intuitionistic fuzzy sets were defined on (α, β) -interval valued set whose elements are pair of closed intervals that the sum of their supremums is equal to 1 or less than 1.

The fundamental properties of these subgroups are examined. The basic propositions and theorems of these groups are given. The relations between (α, β) -interval valued intuitionistic fuzzy subgroup and the level subset of (α, β) -interval valued intuitionistic fuzzy sets are researched. When it is seen that the level subset of (α, β) -interval valued intuitionistic fuzzy sets of G group is a classical group. An example of these groups is given.

REFERENCES

- [1] Atanassov K. T., Intuitionistic Fuzzy Sets. VII IITKR's Session, Sofia, June, (deposed in Central Sci.-Techn. Library of Bulg. Acad. Of Sci. No. 1697/84 (in Bulgaria), 1983. Reprinted: Int. J. Bioautomation 2016, 20, 1, , S1-S6.
- [2] Atanassov K. T. and Gargov, G., Interval Valued Intuitionistic Fuzzy Sets. Fuzzy Sets and Systems 1989, 31, (3), 343-349.
- [3] Atanassov K. T., Operators over Interval Valued Intuitionistic Fuzzy Sets. Fuzzy Sets and Systems 1994, 64, (2), 159-174.
- [4] Atanassov K. T., Intuitionistic Fuzzy Sets. Springer, Heidelberg, 1999.
- [5] Atanassov K. T., Intuitionistic Fuzzy Sets and Interval Valued Intuitionistic Fuzzy Sets. Advanced Studies in Contemporary Mathematics 2018, 28, (2), 167-176.
- [6] Bal, A., Çuvalcıoğlu, G., Tuğrul, F., On Some Fundamental Properties Of α -Interval Valued Fuzzy Subgroups. Thermal Science, 2022, 26, 681-693.
- [7] Bal, A., Çuvalcıoğlu, G., Altıncı, C., (α, β) -Interval Valued Intuitionistic Fuzzy Sets Defined On (α, β) -Interval Valued Set. Journal Of Universal Mathematics, 2023, 6, 114-130.
- [8] Biswas R., Rosenfeld's Fuzzy Subgroups with Interval Valued Membership Functions. Fuzzy Sets and Systems 1994, 63, 87-90.
- [9] Çuvalcıoğlu, G., Bal, A., Çitil, M., The α -Interval Valued Fuzzy Sets Defined On α -Interval Valued Set. Thermal Science, 2022, 26, 665-679.
- [10] Grattan-Guinness I., Fuzzy Membership Mapped onto Interval and Many-valued Quantities. Z. Math. Logik. Grundlehren Math. 1975, 22, 149-160.
- [11] Gorzalczy B., Approximate Inference with Interval-valued Fuzzy Sets. an Outline, in: Proc. Polish Symp. on Interval and Fuzzy Mathematics, Poznan 1983, 89-95.
- [12] Gorzalczy B., A Method of Inference in Approximate Reasoning Based on Interval-valued Fuzzy Sets. Fuzzy Sets and Systems 1987, 21, 1-17.
- [13] Kang H. W., Hur K., Interval-Valued Fuzzy Subgroups and Rings. Honam Mathematical Journal 2010, 32, 4, 593-617.
- [14] Jahn K. U., Intervall-wertige Mengen. Math.Nach 1975, 68, 115-132.
- [15] Mondal T. K., Samanta S. K., Topology of Interval-Valued Fuzzy Sets. Indian J. Pure Applied Math. 1999, 30, (1), 20-38.
- [16] Mondal T. K., Samanta S. K., Topology of Interval-Valued Intuitionistic Fuzzy Sets. Fuzzy Sets and Systems 2004, 119, 483-494.
- [17] Rosenfeld, A., Fuzzy Groups. Journal of Mathematical Analysis and Applications 1971, 35, 512-517.

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. (α, β) -interval valued intuitionistic fuzzy sets, (α, β) -interval valued intuitionistic fuzzy subgroups

- [18] Sambuc R., Fonctions ϕ -floues. Application L'aide au Diagnostic en Pathologie Thyroïdienne, Ph. D. Thesis, Univ. Marseille, France, 1975.
- [19] Turksen I., Interval Valued Fuzzy Sets Based on Normal Forms. Fuzzy Sets and Systems 1986, 20, 191-210.
- [20] Li X., Wang G., T_H -Interval Valued Fuzzy Subgroups. J. Lanzhou University 1997, 32, 96-99.
- [21] Li X., Wang G., The S_H -Interval-valued Fuzzy Subgroups. Fuzzy Sets and Systems 2000, 112, 319-325.
- [22] Aygünöglu A., Varol Pazar B., Çetkin V., Aygün H., Interval Valued Intuitionistic Fuzzy Subgroups on Interval Valued Double t-Norm. Neural Comput. & Applic. 2012, 21, 207-214.
- [23] Zadeh L. A., Fuzzy Sets. Information and Control 1965, 8, 338-353.
- [24] Zadeh L.A., The Concept of a Linguistic Variable and Its Application to Approximate Reasoning. Part 1, Infor. Sci. 1975, 8, 199-249.
- [25] Zadeh L.A., The Concept of a Linguistic Variable and Its Application to Approximate Reasoning. Part 2, Infor. Sci. 1975, 8, 301-357.
- [26] Zadeh L.A., The Concept of a Linguistic Variable and Its Application to Approximate Reasoning. Part 3, Infor. Sci. 1975, 9, 43-80.

MERSIN UNIVERSITY, VOCATIONAL SCHOOL OF TECHNICAL SCIENCES, DEPARTMENT OF MOTOR VEHICLES and TRANSPORTATION TECHNOLOGIES, MERSIN, TURKEY
E-mail address: arif.al.mah@gmail.com

MERSIN UNIVERSITY, FACULTY OF ARTS AND SCIENCES, DEPARTMENT OF MATHEMATICS, MERSIN, TURKEY
E-mail address: gcuvalcioglu@gmail.com

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 242-243

CLASSIFICATION OF BRAIN TUMORS ON MRI IMAGES USING DEEP LEARNING ARCHITECTURES

SUMAYEH SARFARAZI and ÖNSEN TOYGAR

0000-0001-7402-9058

ABSTRACT

A brain tumor is a dangerous neural illness produced by the strict growing of prison cell in the brain or head. The number of patients suffering from brain tumor remains increasingly cumulative. Initial detection of wicked cancers is vital to provide cure to sickness, and early identification reduces the risk of death. If a brain cancer is not predicted in initial phase, it can assuredly cause to death. Hence, primary identification of brain tumors requires the usage of a mechanical means. The segmentation, analysis, and separation of unclean tumor parts from MRI images are the main source of anxiety. Nevertheless, the situation is a boring and slow procedure that radiologists or scientific professionals need to assume, and their act is only reliant on their knowledge. To report the segmented MRI images including tumor, the usage of computer-assisted methods come to be necessary. In this paper, a Convolutional Neural Network (CNN) approach is used to identify brain cancers in MRI images. Two datasets are used for this study, namely Kaggle Brain MRI dataset and Figshare Brain MRI dataset. Models of deep CNN, consisting of VGG16, AlexNet, and ResNet, are utilized to extract deep features. The classification accuracies of the aforementioned deep learning models are used to measure the efficiencies of the implemented systems. For the Kaggle dataset, AlexNet achieves a 98% accuracy, VGG16 has 97% accuracy, and ResNet has 66% accuracy. Among these networks, AlexNet has provided the highest level of accuracy. In the Figshare dataset, AlexNet and VGG16 both achieve 99% accuracy, and ResNet has 96% accuracy. In terms of accuracy, AlexNet and VGG16 outperform ResNet. These performances aid in the early detection of cancers before they cause physical harm such as

REFERENCES

- [1] A. Rehman, M.A. Khan, T. Saba, Z. Mehmood, U. Tariq, and N. Ayesha, "Microscopic Brain Tumor Detection And Classification Using 3D CNN And Feature Selection Architecture," *Microsc. Res. Techn.*, vol. 84, no. 1, pp. 133-149, 2021.
- [2] J. Amin, M. Sharif, M. Yasmin, and S.L. Fernandes, "Big Data Analysis for Brain Tumor Detection: Deep Convolutional Neural Networks," *Future Gener. Comput. Syst.*, vol. 87, pp. 290-297, Oct. 2018.
- [3] S.T. Kebir and S. Mekaoui, "An Efficient Methodology Of Brain Abnormalities Detection Using CNN Deep Learning Network," in *Proc. Int. Conf. Appl. Smart Syst. (ICASS)*, Nov. 2018, pp. 1-5.

Date: July, 8, 2023.

Key words and phrases. brain tumor classification, Convolutional Neural Networks, deep learning

- [4] R. Vinoth and C. Venkatesh, "Segmentation And Detection Of Tumor in MRI Images Using CNN And SVM Classification," in Proc. Conf. Emerg. Devices Smart Syst. (ICEDSS), Mar. 2018, pp. 21–25.
- [5] M. Talo, U.B. Baloglu, O. Yildirim, U.R. Acharya, "Application Of Deep Transfer Learning For Automated Brain Abnormality Classification Using MRI Images," *Cognitive Systems Research*, 54(2019), 176–188.
- [6] A. Çınar, M. Yildirim, "Detection of Tumors on Brain MRI Images Using the Hybrid Convolutional Neural Network Architecture," *Med. Hypotheses*, 139 (2020), 109684.
- [7] A.M. Hasan, H.A. Jalab, F. Meziame, H. Kahtan, A.S. Ahmed, "Combining Deep and Handcrafted Image Features for MRI Brain Scan Classification," *IEEE Access*, pp. 79959–79967, 2019.
- [8] H.T. Zaw, N. Maneerat, K.Y. Win, "Brain Tumor Detection Based On Naïve Bayes Classification," *International Conference on Engineering, Applied Sciences and Technology*, pp.1-4,2019.
- [9] E. Sert, F. Ozyurt, A. Doğantekin, "A New Approach for Brain Tumor Diagnosis System: Single Image Superresolution Based Maximum Fuzzy Entropy Segmentation and Convolutional Neural Network," *Medical Hypothesis*, pp.1-9,2019.
- [10] S. Deepak, P.M. Ameer, "Brain Tumor Classification Using Deep CNN Features via Transfer Learning," *Computers in Biology and Medicine*, pp.1-7,2019.
- [11] T.L. Narayana, TS. Reddy, "An Efficient Optimization Technique to Detect Brain Tumor from MRI Images," *International Conference on Smart Systems and Inventive Technology*, pp.1-4, 2018.
- [12] F.P. Polly, S.K Shil, M.A. Josain, A. Ayman, Y.M.Jang, "Detection and Classification of HGG and LGG Brain Tumor Using Machine Learning," *International conference on Information Networking*, pp.813-817,2018.
- [13] J. Amin, M. Sharif, M. Yamin, S. Fernandis, "A Distinctive Approach in Brain Tumor Detection and Classification Using MRI," *Pattern Recognition Letters*, pp.1- 10, 2017.
- [14] A. Minz, C. Mahobiya, "MR Image Classification Using Adaboost for Brain Tumor Type," *IEEE 7th International Advance Computing Conference*, pp.1-5,2017.
- [15] A.S. Shankar, A. Asokan, D. Sivakumar, "Brain Tumor Classification Using Gustafson-kessel (G-k) Fuzzy Clustering Algorithm," *International Journal of Latest Engineering Research and Applications*, pp.68-72,2016.
- [16] A. Gumael, M.M. Hassan, M.R. Hassan, A.N. Alelaiwi, G. Fortino, "A Hybrid Feature Extraction Method with Regularized Extreme Learning Machine for Brain Tumor Classification," *IEEE Access*, pp. 36266-36273, 2019.
- [17] G. Hemanth, M. Janardhan, L. Sujihelen, "Design and Implementing Brain Tumor Detection Using Machine Learning Approach," *Third International Conference on Trends in Electronics and Informatics*, pp.1-6,2019.
- [18] G. Latif, D.N.F. Iskandar, J.M. Alghazo, N. Mohammad, "Enhanced MR Image Classification Using Hybrid Statistical and Wavelets Features," *IEEE Access*, pp.9634-9644, 2018
- [19] H. Mohsen, E. Sayed, E. Dahshan, A. Badeeh, M. Salem, "Classification Using Deep learning Neural networks for Brain Tumors Future". *Computing and Informatics Journal*, pp.68-73, 2018.
- [20] W. Huafeng, P. Haixia, W. Huafeng, Z. Yanxiang, C. Yehe, "Deep Learning for Image Retrieval: What Works and What Doesn't," *Conference Paper* · November 2015, p.1-22.
- [21] <https://www.kaggle.com/code/blurredmachine/vggnet-16-architecture-complete-guide/notebook>.
- [22] W. Fei, G. Mali, "Single Image Super-Resolution by Residual Recovery Based On an Independent Deep Convolutional Network," *VOLUME 4*, pp. 1–10, 2016.
- [23] Figsharebraintumordataset, <https://doi.org/10.6084/m9.figshare.1512427.v5>, Accessed date: December 2018.
- [24] S. Manav, S. Pramanshu, M. Ritik, G. Kamakshi, "Brain Tumour Detection Using Machine Learning," *Journal of Electronics and Informatics*, December 2021, Volume 3, Issue 4, Pages 298-308,2022.
- [25] K.S. Prabira, K.B. Santi, "A Data Constrained Approach for Brain Tumour Detection Using Fused Deep Features and SVM," *Multimedia Tools and Applications* (2021) 80:28745–28760, 2021.
- [26] R. Arshia, N. Saeeda, I.R. Muhammad, A. Faiza, I. Muhammad, "A Deep Learning-Based Framework for Automatic Brain Tumors Classification Using Transfer Learning," *Circuits, Systems, and Signal Processing* (2020) 39:757–775,2020.
- [27] P. Özlem, G. Cafer, "Classification of Brain Tumors from MR Images Using Deep Transfer Learning," *The Journal of Supercomputing*, volume 77, pages7236–7252 (2021).

COMPUTER ENGINEERING DEPARTMENT, FACULTY OF ENGINEERING, EASTERN MEDITERRANEAN UNIVERSITY, 99628, FAMAGUSTA, NORTH CYPRUS, VIA MERSIN 10, TURKEY.
E-mail address: samaneh.sarfarazi@emu.edu.tr

COMPUTER ENGINEERING DEPARTMENT, FACULTY OF ENGINEERING, EASTERN MEDITERRANEAN UNIVERSITY, 99628, FAMAGUSTA, NORTH CYPRUS, VIA MERSIN 10, TURKEY.
E-mail address: onsen.toygar@emu.edu.tr

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 244-245

ACTIVE PACKAGING FILMS INCORPORATED WITH ESSENTIAL OILS IN NANOEMULSION FORMULATION

NATALIA MARAT¹, ALEKSANDRA POKRZYWIŃCZ², DIDEM DEMİR^{3*}, YASIN ÖZAY⁴ and GULDEN GOKSEN^{5*}

0000-0002-0102-0869, 0000-0002-5065-1004, 0000-0002-2977-2077, 0000-0001-5419-6115 and 0000-0002-5432-7936

ABSTRACT

Biodegradable films and coatings are an effective alternative to conventional plastics. The purpose of their use is to extend the shelf life of perishable food and maintain or improve the quality and safety of prepared food. Their performance also depends on the type of additive used. An example of such an additive can be essential oils, which are a good material for active packaging due to their safety and antibacterial and antioxidant properties. The aim of the research was to fabricate Sage Leaf essential oil (SLEO) nanoemulsions added to the polymeric film and determine the main physicochemical properties of the films and the effect of the addition of this oil on the biological properties of active films. The control films were made from a hybrid solution of Poly vinyl alcohol (PVA) and Chitosan. On the other hand, the nanoemulsions of SLEO at different concentrations were prepared using ultrasonication. Films with the addition of SLEO were made analogously, adding the nanoemulsion of SLEO in the last step. The solvent casting method was used to prepare control films and SLEO-added films. For the characterization analyses, the droplet size of emulsions was determined using Zeta-Sizer, and the stability of nanoemulsions was also studied. Active films were evaluated with microscopy images, Fourier transform infrared spectroscopy, contact angle measurements, water vapor permeability, and determination of solubility in water. It is aimed to produce environmentally friendly, edible and sustainable packaging materials by combining biocompatible and biodegradable polymeric films with antibacterial essential oils. At the same time, it is aimed to minimize microbial spoilage and extend shelf life by increasing antibacterial and antioxidant properties with the added essential oil.

Date: July, 8, 2023.

Key words and phrases. Sage leaf essential oil, nanoemulsion, polymer, film, active packaging

REFERENCES

- [1] Zhang, X., Liu, D., Jin, T. Z., Chen, W., He, Q., Zou, Z., & Guo, M. Preparation and characterization of gellan gum-chitosan polyelectrolyte complex films with the incorporation of thyme essential oil nanoemulsion. *Food hydrocolloids*, 114, 106570, (2021).
- [2] Ghoshal, G. Thyme essential oil nano-emulsion/Tamarind starch/Whey protein concentrate novel edible films for tomato packaging. *Food Control*, 138, 108990, (2022).
- [3] Elshamy, S., Khadizatul, K., Uemura, K., Nakajima, M., & Neves, M. A. Chitosan-based film incorporated with essential oil nanoemulsion foreseeing enhanced antimicrobial effect. *Journal of Food Science and Technology*, 58, 3314-3327, (2021).

¹ DEPARTMENT OF HUMAN NUTRITION, FACULTY OF FOOD SCIENCE, UNIVERSITY OF WARMIA AND MAZURY, UL. SŁONECZNA 45B, 10-718 OLSZTYN, POLAND

² DEPARTMENT OF COMMODITY AND FOOD ANALYSIS, FACULTY OF FOOD SCIENCE, UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN, 10-726 OLSZTYN, POLAND

³ DEPARTMENT OF CHEMISTRY AND CHEMICAL PROCESSING TECHNOLOGIES, TECHNICAL SCIENCE VOCATIONAL SCHOOL, MERSIN UNIVERSITY, MERSIN, TÜRKIYE
E-mail address: ardemdemir@tarsus.edu.tr

⁴ DEPARTMENT OF ENVIRONMENTAL PROTECTION TECHNOLOGIES, TARSUS UNIVERSITY, 33400, MERSIN, TÜRKIYE
E-mail address: yasinozay@tarsus.edu.tr

⁵ DEPARTMENT OF FOOD TECHNOLOGY, VOCATIONAL SCHOOL OF TECHNICAL SCIENCES AT MERSIN TARSUS ORGANIZED INDUSTRIAL ZONE, TARSUS UNIVERSITY, 33100 MERSIN, TÜRKIYE
E-mail address: guldengoksen@tarsus.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 246-247

SMART FILM PRODUCTION BY INCLUDING BIOACTIVE COMPOUNDS

ALEKSANDRA PURKIEWICZ², NATALIA MAKAT¹, DIDEM DEMİR^{3*}, YASIN ÖZAY⁴ and GULDEN GOKSEN^{5*}

0000 0002 5065 0381, 0000-0002-5102-1069, 0000-0002-2977-207, 0000-0001-5419-6115 and 0000-0002-5432-7936

ABSTRACT

Packaging is an integral part of many food products and has a significant impact on their commercial appeal. In connection with the growing awareness of consumers, packaging, in addition to its protective, informational or commercial function, increasingly exhibits other functional properties. One of the new generations of packaging is smart packaging, which, through an indicator placed inside, provides consumers with information about the current quality of the product. It allows to get information about food quality and safety without opening the package. The aim of the study was to develop novel active edible coating with addition of black carrot extract as a pH indicator and to study the physicochemical properties of the produced coatings. For this aim, film forming solutions for control films were made with pectin and locus bean gum polymers. Then, different amounts of black carrot extract were directly added to the polymer solutions and final coatings were prepared by solvent-casting. The prepared films were characterized in terms of selected properties: chemical structure, morphology, mechanical behaviour and sensing properties. In the light of the results obtained from the study, it is aimed to produce antibacterial, biodegradable and environmentally friendly packaging materials with the combination of natural ingredients. The use of such packaging solutions is a convenience for consumers, who can monitor the safety and quality of food products themselves. Moreover, better control over the freshness status of food products can make it easier to manage food with a short shelf life, which will significantly reduce food waste worldwide.

Date: July, 8, 2023.

Key words and phrases. biopolymers, bioactive compounds, solvent casting, smart films

REFERENCES

- [1] Koosha, M., & Hamed, S. Intelligent Chitosan/PVA nanocomposite films containing black carrot anthocyanin and bentonite nanoclays with improved mechanical, thermal and antibacterial properties. *Progress in Organic Coatings*, 127, 338-347, (2019).
- [2] Wu, Y., & Li, C. A smart film incorporating anthocyanins and tea polyphenols into sodium carboxymethyl cellulose/polyvinyl alcohol for application in mirror carp. *International Journal of Biological Macromolecules*, 223, 404-417, (2022).
- [3] Oladzadabbasabadi, N., Nafchi, A. M., Ghasemloo, M., Arifin, F., Singh, Z., & Al-Hassan, A. A. Natural anthocyanins: Sources, extraction, characterization, and suitability for smart packaging. *Food Packaging and Shelf Life*, 33, 100872, (2022).

¹ DEPARTMENT OF HUMAN NUTRITION, FACULTY OF FOOD SCIENCE, UNIVERSITY OF WARMIA AND MAZURY, UL. SŁONECZNA 45F, 10-718 OLSZTYN, POLAND

² DEPARTMENT OF COMMODITY AND FOOD ANALYSIS, FACULTY OF FOOD SCIENCE, UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN, 10-726 OLSZTYN, POLAND

³ DEPARTMENT OF CHEMISTRY AND CHEMICAL PROCESSING TECHNOLOGIES, TECHNICAL SCIENCE VOCATIONAL SCHOOL, MERSIN UNIVERSITY, MERSIN, TÜRKIYE
E-mail address: didemdemir@tarsus.edu.tr

⁴ DEPARTMENT OF ENVIRONMENTAL PROTECTION TECHNOLOGIES, TARSUS UNIVERSITY, 33400, MERSIN, TÜRKIYE
E-mail address: yasinozay@tarsus.edu.tr

⁵ DEPARTMENT OF FOOD TECHNOLOGY, VOCATIONAL SCHOOL OF TECHNICAL SCIENCES AT MERSIN TARSUS ORGANIZED INDUSTRIAL ZONE, TARSUS UNIVERSITY, 33100 MERSIN, TÜRKIYE
E-mail address: guldengoksen@tarsus.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 248-249

**PISTACHIO SPECIES IDENTIFICATION USING HISTOGRAM OF ORIENTED
GRADIENT DESCRIPTORS AND SUPPORT VECTOR MACHINE**

BİRKAN BÜYÜKARIKAN

0000-0002-9703-9678

ABSTRACT

Developing intelligent systems, including computer vision and machine learning technologies for classifying agricultural products according to their types, are an interesting research topic. Here, models are obtained with the help of intelligent systems to decide. These models simulate human visual perception for the classification of agricultural products. In this study, an approach combining the histogram of oriented gradients (HOG) technique and support vector machine (SVM) was proposed for pistachio image species classification. In this study, image features were extracted using different cell sizes of the HOG. These features were classified using different kernel functions of SVM with 10-fold cross-validation. Thus, this study investigated the possibility of improving an existing method by making it learnable. In the experimental results, the proposed approach achieved different success with a different number of features. This study showed that the best performance results were obtained in the model where the cell size was 128 x 128 and the kernel type was polynomial. The accuracy of this model was 0.940, sensitivity 0.938, specificity 0.941, F-score 0.930, G-mean 0.931, and AUC value 0.978.

Date: July, 8, 2023.

Key words and phrases. Histogram of oriented gradient, support vector machine, Pistachio species, detection

REFERENCES

- [1] Acar I, Eti S, Nut quality of 'Kirmizi', 'Siirt' and 'Ohadi' pistachio cultivars as affected by different pollinators. V International Symposium on Pistachios and Almonds 912, 81-86, (2009)
- [2] Ayhan S, Erdoğan Ş, Destek vektör makineleriyle sınıflandırma problemlerinin çözümü için çekirdek fonksiyonu seçimi. Eskişehir Osmangazi Üniversitesi İktisadi ve İdari Bilimler Dergisi, 9 (1): 175-201, (2014)
- [3] Balta F, Phenotypic differences of nut and yield characteristics of siirt pistachios ((*pistacia vera* L.) growth in siirt province. Journal Of The American Pomological Society, 56 (1): 50, (2003)
- [4] Başaran E, Image Wavelet Scattering and Densenet Based Pistachio Identification. Uluslararası Anadolu Ziraat Mühendisliği Bilimleri Dergisi, 4 (3): 81-87, (2022).
- [5] Bellomo M, Fallico B, Anthocyanins, chlorophylls and xanthophylls in pistachio nuts (*Pistacia vera*) of different geographic origin. Journal of Food Composition and Analysis, 20 (3-4): 352-359, (2007).
- [6] Christiansen RH, Hsu J, Gonzalez M, Wood SL, Monocular vehicle distance sensor using HOG and Kalman tracking. 2017 51st Asilomar Conference on Signals, Systems, and Computers, 178-182, (2017).
- [7] Chu H, Zhang D, Shao Y, Chang Z, Guo L, Zhang N, Using HOG descriptors and UAV for crop pest monitoring. 2018 Chinese Automation Congress (CAC), 1516-1517, (2018).
- [8] Ebrahimzadeh R, Jampour M, Efficient handwritten digit recognition based on histogram of oriented gradients and SVM. International Journal of Computer Applications, 104 (9), (2014).
- [9] Kumar SS, Sigappi A, Thomas GAS, Robinson YH, Raja S, Classification and Analysis of Pistachio Species Through Neural Embedding-Based Feature Extraction and Small-Scale Machine Learning Techniques. International Journal of Image and Graphics, 2450032, (2023).
- [10] Kusumoj S, Heryanto A, Mahendra O, Pardede HF, Machine learning-based for automatic detection of corn-plant diseases using image processing. 2018 International conference on computer, control, informatics and its applications (IC3INA), 93-97, (2018).
- [11] Külekçi M, Aksoy A, Gaziantep ili dağ ve ova köylerinde antepfıstığı üretim maliyetlerinin karşılaştırılması. Uludağ Üniversitesi Ziraat Fakültesi Dergisi, 25 (1): 41-51, (2011).
- [12] Lisha L, Kusri K, Ariatanto D, Classification of Pistachio Nut Using Convolutional Neural Network. Inform: Jurnal Ilmiah Bidang Teknologi Informasi dan Komunikasi, 8 (1): 71-77, (2023).
- [13] Ozkan IA, Koklu M, Saraçoğlu R, Classification of pistachio species using improved k-NN classifier. Health, 23: e2021044, (2021).
- [14] Özalın Ö, Köklü M, Yonar A, Yeniay Ö, Automatically Image Classification Based on a New CNN Architecture, (2022).
- [15] Padmapriya J, Sasilatha T, Deep learning based multi-labelled soil classification and empirical estimation toward sustainable agriculture. Engineering Applications of Artificial Intelligence, 119: 105690, (2023).
- [16] Pothan ME, Pai ML, Detection of rice leaf diseases using image processing. 2020 Fourth International Conference on Computing Methodologies and Communication (ICCMC), 424-430, (2020).
- [17] Singh D, Taspınar YS, Kursun R, Cinar I, Koklu M, Ozkan IA, Lee H-N, Classification and analysis of pistachio species with pre-trained deep learning models. Electronics, 11 (7): 981, (2022).
- [18] Tunalioglu R, Taskaya B, Antepfıstığı Tarımsal Ekonomi Araştırma Enstitüsü. TEAE Bakış, 5: 1-4, (2003).
- [19] Yu P-S, Chen S-T, Chang I-F, Support vector regression for real-time flood stage forecasting. Journal of hydrology, 328 (3-4): 704-716, (2006).

DEPARTMENT OF COMPUTER TECHNOLOGIES, ULUBORLU SELAHATTIN KARASOY VOCATIONAL SCHOOL, ISPARTA UNIVERSITY OF APPLIED SCIENCES, ISPARTA, TURKEY
E-mail address: birkanbuyukarikan@isparta.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 250

ON FUZZY BOOLEAN ALGEBRA WITH RESPECT TO NEW FUZZY LOGIC CONJUNCTION

GÖKHAN ÇUVALCIOĞLU AND GUL KARADENİZ GOZERI

0000-0001-5451-3336 and 0000-0003-0396-4617

ABSTRACT

Fuzzy logic rules are given by means of triangular norms (t-norm) defined on the unit interval. A triangular conorm (t-conorm) is obtained for each triangular norm. For the negation of expressions, functions defined on the unit interval are used. The structure established through these functions contributes to the formation of fuzzy set theory and fuzzy mathematical structures as in the classical theory. Mathematical structures are used in many fields of engineering. In this study, the definition of the concept of xnorm is given. The properties of xnorms were examined. Fuzzy Boolean Algebra (FBA) structure definition is given by using t-norm, t-conorm, known negation and corresponding xnorm. Also, basic properties provided by FBAs were given.

REFERENCES

- [1] G. Deschrijver, E.E. Kerre, Triangular norms and related operators in L-fuzzy set theory, in: E.P. Klement, R. Mesiar (Eds.), Logical, Algebraic, Analytic, and Probabilistic Aspects of Triangular Norms, Elsevier, Amsterdam, pp. 231–259, (2005).
- [2] J.A. Goguen, L-fuzzy sets, J. Math. Anal. Appl. 18 (1), pp.145–174, (1967).
- [3] L.A. Zadeh, Fuzzy Sets, Information and Control 8, pp.338-353, (1965).

(Gökhan Çuvalcıoğlu) MERSİN UNIVERSITY, MATHEMATICS DEPARTMENT, 33016, MERSİN, TURKEY
Email address: gcuvalcioglu@mersin.edu.tr

(Gul Karadeniz Gozeri) ISTANBUL UNIVERSITY, MATHEMATICS DEPARTMENT, ISTANBUL, TURKEY
Email address: gulkaradeniz@istanbul.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. Primary 235A256, 236B456; Secondary 125A145.

Key words and phrases. xnorm, t-norm, Fuzzy Boolean Algebra, FBA.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
08-11 JULY 2023 TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 251

ON THE PROPERTIES OF THE XNORM CORRESPONDING TO THE MINIMUM T-NORM

GUL KARADENİZ GOZERİ, SEVİLAY DEMİR SAGLAM, AND GÖKHAN ÇUVALCIOĞLU

0000-0003-0396-4617, 0000-0003-4615-6863 and 0000-0001-5451-3336

ABSTRACT

It is known that the generally accepted t-norm in fuzzy set theory is the minimum norm. The algebraic structure of fuzzy set theory is examined, thanks to the symbolic logic system created by the minimum t-norm. In this study, the definition of the Gmin xnorn corresponding to the minimum t-norm is given. The basic properties of the Gmin xnorn were examined, and their relations with the Tmin t-norm and Smax t-conorm were given. With the help of these properties, the algebraic properties of Fuzzy sets are contributed.

REFERENCES

- [1] G. Deschrijver, E.E. Kerre, Triangular norms and related operators in L -fuzzy set theory, in: E.P. Klement, R. Mesiar (Eds.), Logical, Algebraic, Analytic, and Probabilistic Aspects of Triangular Norms, Elsevier, Amsterdam, pp. 231–259, (2005).
- [2] J.A. Goguen, L-fuzzy sets, J. Math. Anal. Appl. 18 (1), pp.145–174, (1967).
- [3] L.A. Zadeh, Fuzzy Sets, Information and Control 8, pp.338-353, (1965).

(Gul Karadeniz Gozeri) ISTANBUL UNIVERSITY, MATHEMATICS DEPARTMENT, ISTANBUL, TURKEY
Email address: gulkaradeniz@istanbul.edu.tr

(Sevilay Demir Saglam) ISTANBUL UNIVERSITY, MATHEMATICS DEPARTMENT, ISTANBUL, TURKEY
Email address: sevilay.demir@istanbul.edu.tr

(Gökhan Çuvalcıoğlu) MERSIN UNIVERSITY, MATHEMATICS DEPARTMENT, 33016, MERSIN, TURKEY
Email address: gcuvalcioglu@mersin.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. Primary 235A256, 236B456; Secondary 125A145.

Key words and phrases. xnorn, t-norm, Fuzzy Boolean Algebra, FBA.

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 252

CONTRA CONTINUITY FOR λ -STRONG β -I-CLOSED SETS

SEYFETTİN FİDAN and AYNUR KESKİN KAYMAKCI

0000-0001-2680-7420 and 0000-0001-5909-8477

ABSTRACT

In this paper we investigate the notion of λ -strong β -I-open sets which are complement of λ -strong β -I-closed sets. Then, defining types of contra continuity for λ -strong β -I-closed sets we will give properties and characterizations of them. We investigate the relationships among the other functions with it.

REFERENCES

- [1] Arinas F. G., Dontchev J., Ganster M., On λ -sets and dual of generalized continuity, Questions Answers Gen. Topology, 15, 3-13, (1997).
- [2] M. Caldas, E. Ekici, S. Jafari and T. Noiri, On the class of contra λ -continuous functions, Annales Univ. Sci. Budapest., 49, 75-86, (2006).
- [3] E. Hatır, A. Keskin and T. Noiri, On a New Decomposition of Continuity via Idealization, JP Jour. Geometry and Topology, 3(1), 53-64, (2003).
- [4] D. Jankovic and T. R. Hamlett, New topologies from old via ideals, Amer. Math. Monthly, 97, 295-310, (1990).
- [5] K. Kuratowski, Topologie I, Monografie Matematyczne, tom 3, PWN-Polish Scientific Publishers, Warszawa, 1933.
- [6] Tekin(Akkoyun) and A. Keskin Kaymakci, On Maki's λ -sets via strong β -I-open set, 4th International Conference on Pure and Applied Mathematics (ICPAM-VAN 2022), VAN(2022).

SELÇUK UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF MATHEMATICS, CAMPUS, 42031,
KONYA/TÜRKİYE
E-mail address: 1seyfettinfidan1@gmail.com

SELÇUK UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF MATHEMATICS, CAMPUS, 42031,
KONYA/TÜRKİYE
E-mail address: akeskin@selcuk.edu.tr

Date: July, 8, 2023.

2000 Mathematics Subject Classification. Primary 54 C08; Secondary 54 D10.

Key words and phrases. strong β -I-open, λ -strong β -I-closed set, λ -strong β -I-open set, λ -strong β -I-contra continuous functions.

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 253-254

INVESTIGATION OF THE EFFECT OF TYPES AND PARTICLE SIZES OF REINFORCEMENTS ON COMPOSITE HARDNESS OF AL6061

ALPEREN DİNÇER¹, MERVE TUR¹, TURKER TURKOGLU¹ and SARE CELİK¹

0009-0009-2451-1732, 6065-6097-0674-9839, 0000-0002-0499-9363 and 0000-0001-8240-5447

ABSTRACT

Since the prices of ferrous and non-ferrous raw materials in the industry are increasing day by day and the parts in the machines have more complex geometric structures, it is necessary to use new production methods according to the geometric structure of the part to be produced, the desired strength and hardness value [1-3]. By using powder metallurgy production method, which is one of the innovative production methods, material efficiency, complex geometric shaping, fewer process steps as well as composite material production, strength and hardness of the produced material can be increased [4-5]. In this study, as a result of literature research, different types of reinforcements were added by weight to aluminium matrix composites at the same production parameters for each composite material produced. The reinforcement groups used consist of titanium carbide (TIC) and Graphene Nano Platelets (GNP). In this study, mono and hybrid composites with Al6061 matrix structure were successfully fabricated. The composites produced are Al6061/TIC, Al6061/GNP, Al6061/TIC/GNP. Hardness tests were performed according to Vickers hardness standards to determine the change in hardness of the composite materials produced according to the reinforcement type. As a result of the hardness tests, the changes in the hardness value of the composite materials produced by powder metallurgy method compared to the unreinforced Al6061 material were investigated and a significant increase in hardness was obtained with reinforcement.

Date: July, 8, 2023.

2000 Mathematics Subject Classification. Primary AAAA; Secondary BBBB.

Key words and phrases. powder metallurgy, metal matrix composite, hardness

REFERENCES

- [1] Z. Hu et al., "Graphene-reinforced metal matrix nanocomposites - A review," *Mater. Sci. Technol. (United Kingdom)*, vol. 32, no. 9, pp. 930–953, 2016.
- [2] R. Ranjan and V. Bajpai, "Graphene-based metal matrix nanocomposites: Recent development and challenges," *J. Compos. Mater.*, 2021.
- [3] A. Naseer et al., "A review of processing techniques for graphene-reinforced metal matrix composites," *Mater. Manuf. Process.*, vol. 34, no. 9, pp. 957–985, 2019.
- [4] V. Khanna et al., "Fabrication of efficient aluminium/graphene nanosheets (Al-GNP) composite by powder metallurgy for strength applications," *J. Mater. Res. Technol.*, vol. 22, pp. 3402–3412, 2023.
- [5] P. Lava Kumar, A. Lombardi, G. Górczyński, S. S. Narayana Murty, B. S. Murty, and L. Bichler, "Recent advances in aluminium matrix composites reinforced with graphene-based nanomaterial: A critical review," *Prog. Mater. Sci.*, vol. 128, no. April, p. 100948, 2022.

¹DEPARTMENT OF MECHANICAL ENGINEERING, BALIKESIR UNIVERSITY, 10145, BALIKESIR, TURKEY.

E-mail address: alpeben99@gmail.com

E-mail address: merve166@gmail.com

E-mail address: turker_turkoglu@balikesir.edu.tr

E-mail address: scelik@balikesir.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 255-256

NUMERICAL SIMULATION OF GRAPHENE/N-WS₂/A-SI:H(I)/P-CSi/AG HIT SOLAR CELLS

NAHIDE KUTABULUTLU¹, BÜŞRA AYDIN³ and ÇAĞLAR DUMAN^{2,3}

0009-0006-0002-0002, 0000-0002-5465-5446 and 0000-0002-1845-8605

ABSTRACT

The discovery of new materials has led to advances in optoelectronic technology and has become a major source of motivation for many researchers. This has enabled higher efficiency values to be achieved in solar cells, which have a very important place in optoelectronic technology [1, 2]. Heterojunction with intrinsic thin layer (HIT) solar cells are one of the highest cell efficiency among silicon-based solar cells. HIT solar cells can be produced in different configurations [3, 4]. In this study, graphene/n-WS₂/a-Si:H(i)/p-cSi/Ag HIT solar cell was designed and some important photovoltaic properties were analyzed by using AFORS-HET software (version 2.5). Tungsten disulfide (WS₂) is an important member of the transition metal dicalcogenides (TMDCs) class, which includes hexagonal structured, layered materials with molecular formula of XY₂, where X is transition metals such as Nb, W, and Mo, and Y is chalcogens such as Te, Se, and S [5, 6]. Recently, ultrathin WS₂ has become one of the interesting materials in the investigation of solar cell structures due to its superior electrical and optical features [7]. The most important aim of this study is to find a suitable way to enhance the performance of n-type WS₂/p-cSi heterojunction solar cells through simulation. The parameters of both the Si and WS₂ layers were optimized, and a photovoltaic conversion efficiency value of 23.47% was obtained in the simulations. As a result, it has been shown that the WS₂ material and the designed structure can be used in solar cell applications.

Date: July, 8, 2023.

Key words and phrases. AFORS-HET, HIT solar cells, WS₂, power conversion efficiency

REFERENCES

- [1] Kim, J. Y., Lee, J. W., Jung, H. S., Shin, H., & Park, N. G. High-efficiency perovskite solar cells. *Chemical reviews*, 120(15), 7867-7918, (2020).
- [2] Massiot, I., Cattoni, A., & Collin, S. Progress and prospects for ultrathin solar cells. *Nature Energy*, 5(12), 959-972, (2020).
- [3] Borah, C. K., Tyagi, P. K., & Kumar, S. The prospective application of a graphene/MoS₂ heterostructure in Si-HIT solar cells for higher efficiency. *Nanoscale advances*, 2(8), 3231-3243, (2020).
- [4] Dwivedi, N., Kumar, S., Bisht, A., Patel, K., & Sudhakar, S. Simulation approach for optimization of device structure and thickness of HIT solar cells to achieve ~17% efficiency. *Solar energy*, 88, 31-41, (2013).
- [5] Radisavljevic, B., Radenovic, A., Brivio, J., Giacometti, V., & Kis, A. Single-layer MoS₂ transistors. *Nature nanotechnology*, 6(3), 147-150, (2011).
- [6] Choudhary, N., Patel, M. D., Park, J., Sirota, B., & Choi, W. Synthesis of large scale MoS₂ for electronics and energy applications. *Journal of Materials Research*, 31(7), 824-831, (2016).
- [7] Roy, S., & Bermel, P. Electronic and optical properties of ultra-thin 2D tungsten disulfide for photovoltaic applications. *Solar Energy Materials and Solar Cells*, 174, 370-379, (2018).

¹DEPARTMENT OF ELECTRIC AND ENERGY, TECHNICAL SCIENCE VOCATIONAL SCHOOL, ATATÜRK UNIVERSITY, ERZURUM, 25240, TURKEY
E-mail address: nahide.karabulut23@erzurum.edu.tr

²DEPARTMENT OF PHOTONICS, GRADUATE SCHOOL OF SCIENCES, ERZURUM TECHNICAL UNIVERSITY, ERZURUM 25050, TURKEY

³DEPARTMENT OF ELECTRIC ELECTRONICS ENGINEERING, FACULTY OF ENGINEERING AND ARCHITECTURE, ERZURUM TECHNICAL UNIVERSITY, ERZURUM 25050, TURKEY

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 257-258

THEORETICAL INVESTIGATION OF ALTERNATIVE FUELS WHICH CAN BE USED ON SHIPS

MÜNİR SÜNNETÇİ, BURRA SARPER, SERVET UZEL, NEDİM KIZILKAYA

0000-0002-3714-7044

ABSTRACT

In this study, it is concentrated on biodiesel, which stands out with many other features such as not requiring engine-machine modifications, being cleanly synthesizable, and it allowing a wide range of flexible modifications and fuel mixtures thanks to its low carbon and near-sulfur content. The study also includes theoretical comparisons of alternative fuels with machine performance and emission aspects.

Comparisons with the diesel engine show that biodiesel has poor atomization as a side effect of high viscosity, which reduces the combustion efficiency of the machine at high torques and can increase exhaust gas temperatures. LNG and hydrogen, which have low viscosity in this regard, can show better results with the same mass injection amounts and suitable mixtures in suitable engines. In addition that, the self-ignition temperature of biodiesel is higher than diesel; unlike other alternative fuels, its use in a diesel engine does not require modification as it can give the lowest ignition delay desired for a diesel engine compared to other alternative fuels due to the low cetane number. Biodiesel does not require modification for the fuel-air mixture ratio or requires less than other fuels. Biodiesel provides lower efficiency and power output as it has lower thermal values than conventional diesel. Hydrogen and LNG will be preferable choices on these issues. All alternative fuels, except prolytic, are sulfur free or very low sulfur content. Therefore, it does not require hydrodesulphurization, which reduces biodiesel lubrication, and maintains its good lubrication and extends the life of the materials. It has been observed that the biodiesel has a higher flash point compared to the fuels compared and it is understood that it is the most reliable fuel for storage-transport-transfer. Methanol and ethanol, which accumulate less electric charge than other fuels, were found to be more reliable due to their lower electrical resistance. It increases NO_x emissions in general with results that may vary depending on the biodiesel raw material, engine and loads. While CO_2 emission does not change on average, it decreases SO_x emissions like all other alternative fuels. The only fuel that produces emissions below all emission limits in Marpol regulations is found as LNG

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Emission, Altenative Fuels, Ships, Energy, Green Environment, Air Pollution.

- [1] Deniz Ticaret Odası, Rakamlarla Denizcilik Sektörü ve İstatistikler, c. 2, sy. 1. 2017
- [2] Corbett, J.J., Fischbeck, P.S., ve Pandis, S.N., "Global nitrogen and sulfur inventories for oceangoing ships," *Journal of Geophysical Research Atmospheres*, c. 104, sy. D3, ss. 3457-3470, 1999.
- [3] Mauderly, J.L., "Environmental toxicants: human exposures and their health effects," New York: Van Nostrand Reinhold; 1992. p. 119-55.
- [4] WHO. World health report. Reducing risks, promoting healthy life. Geneva Switzerland: World Health Organization; 2002.
- [5] WHO. Health aspects of air pollution with particulate matter, ozone and nitrogen dioxide. Report on a WHO working group, January 2003. Copenhagen, Denmark: WHO Regional Office for Europe; 2003.
- [6] Smith, T. W. P., vd., "Third IMO Greenhouse Gas Study 2014," 2014.
- [7] Bouman, E.A., Lindstad, E., Riiland, A.I., ve Strømman, A.H., "State-of-the-art technologies, measures, and potential for reducing GHG emissions from shipping - A review," *Transportation Research Part D: Transport and Environment*, c. 52, ss. 408-421, 2017.
- [8] Abed, K. A., El Morsi, A. K., Sayed, M. M., Shaib, A. A. E., ve Gad, M. S., "Effect of waste cooking-oil biodiesel on performance and exhaust emissions of a diesel engine," *Egyptian Journal of Petroleum*, c. 27, ss. 985-989, 2018.
- [9] Zareh, P., Zare, A. A., ve Ghobadian, B., "Comparative assessment of performance and emission characteristics of castor, coconut and waste cooking based biodiesel as fuel in a diesel engine," *Energy*, c. 139, ss. 883-894, 2017.
- [10] Qureshi, M. W. G., Khan, Z. M., Hussain, M., Ahmad, F., Shoaib, M. ve Qasim, M., "Experimental evaluation of a diesel engine for combustion, performance and exhaust emissions with fuel blends derived from a mixture of fish waste oil and waste cooking oil biodiesel," *Polish Journal of Environmental Studies*, c. 28, sy. 4, ss. 2793-2803, 2019.
- [11] Y. fen Lin, Y. ping G. Wu, ve C. T. Chan, "Combustion characteristics of wasteoil produced biodiesel/ diesel fuel blends," *Fuel*, c. 86, ss. 1772-1780, 2007.
- [12] H. Chen, B. Xie, J. Ma, ve Y. Chen, "NO_x emission of biodiesel compared to diesel: Higher or lower?," *Applied Thermal Engineering*, c. 137, ss. 584-589, 2018.
- [13] Dimitriou, P., Tsujimura T., ve Suzuki, Y., "Adopting biodiesel as an indirect way to reduce the NO_x emission of a hydrogen fumigated dual-fuel engine," *Fuel*, c. 244, ss. 324-334, 2019.
- [14] Mahfouz, A., Gao, M. S., El Fatih, A., ve Emara, A., "Comparative study of combustion characteristics and exhaust emissions of waste cooking-diesel fuel blends," *Ain Shams Engineering Journal*, c. 9, ss. 3123-3134, 2018.
- [15] Hirkude, S., Bhatnagar, V., ve Randhir, J., "Effect of Compression Ratio, Injection Pressure and Injection Timing on Performance and Smoke Emissions of CI engine Fuelled with Waste Fried Oil Methyl Esters - Diesel Blend," *Materials Today: Proceedings*, c. 5, ss. 1513-1570, 2018.
- [16] Yıksek, L., Çelebi, O., Kızılkın, V., ve Arslan, H. E., "Atık yağ biyodizelinin farklı sıkıştırma oranlarındaki dizel motorlarda kullanımının uygunluğunun araştırılması," *DÜMF Mühendislik Dergisi*, c. 9, sy. 2, ss. 765-774, 2018.
- [17] Hüseinzadeh-Bandbafha H., vd., "Effects of aqueous carbon nanoparticles as a novel nanoadditive in water-emulsified diesel/biodiesel blends on performance and emissions parameters of a diesel engine," *Energy Conversion and Management*, c. 197, ss. 1153-1166, 2019.
- [18] L. Geng, Y. Chen, X. Chen ve C. fon F. Lee, "Study on combustion characteristics and particulate emissions of a common-rail diesel engine fueled with nbutanol and waste cooking oil blends," *Journal of the Energy Institute*, c. 92, ss. 438-449, 2019.
- [19] Dwivedi, G. M., Sharma, P., Verma, P., ve Kumar, P., "Engine Performance Using Waste Cooking Biodiesel and Its Blends with Kerosene and Ethanol," *Materials Today: Proceedings*, c. 5, ss. 22955-22962, 2018.
- [20] Chen, H., He, J., Chen Y., ve Hua, H., "Performance of a common rail diesel engine using biodiesel of waste cooking oil and gasoline blend," *Journal of the Energy Institute*, c. 91, ss. 856-866, 2018.
- [21] Kaya, C., "Biyodizelin Gemi Dizel Motorlarında Alternatif Yakıt Olarak Kullanımının Deneysel Olarak İncelenmesi", T.C. Yıldız Teknik Üniversitesi Fen Bilimleri Enstitüsü, Aralık, 2019.
- [22] Singh, S.P., Singh D., "Biodiesel production through the use of different sources and characterization of oils and their esters as the substitute of diesel: a review," *Renew Sustain Energy Rev*, 14 (2010), pp. 200-216.
- [23] Kumar, A., Kumar, K., Kaushik, N., Sharma, S., Mishra S., "Renewable energy in India: current status and future potentials," *Renew Sustain Energy Rev* (2010).
- [24] Singh, D., Sharma, D., Soni, S.L., Sharma, S., Kumari, D., Chemical compositions, properties, and standards for different generation biodiesels: a review *Fuel*, 253 (2019), pp. 60-71.
- [25] Mahdavi, M., Abedini, E., Darabi, A.H., Biodiesel synthesis from oleic acid by nanocatalyst (ZrO₂ /Al₂O₃) under high voltage conditions *RSC Adv*, 5 (2015), pp. 55027-55032.
- [26] E.F. Aransiola, T.V. Ojumu, O.O. Oyekola, T.F. Madzimbamuto, D.I.O. Ikhu-Omoregbe A review of current technology for biodiesel production: state of the art *Biomass Bioenergy*, 61 (2014), pp. 276-297.
- [27] Shameer, P.M., Ramesh, K., Sakthivel, R., Purnachandran, R., Experimental evaluation on oxidation stability of biodiesel/diesel blends with alcohol addition by rancimat instrument and FTIR spectroscopy *J Mech Sci Technol*, 31 (1) (2017), pp. 455-463.
- [28] Digambar Singh, Dilip Sharma, S.L. Soni, Sumit Sharma, Pushpendra Kumar Sharma, Amit Jhalani A review on feedstocks, production processes, and yield for different generations of biodiesel Fuel, Volume 262, 15 February 2020, Article 116553, pp. 4.

DEPARTMENT OF MECHANICAL, FACULTY OF ENGINEERING, TARSUS UNIVERSITY, MERSIN, TURKEY

E-mail address: msuner@tarsus.edu.tr

DEPARTMENT OF MECHANICAL, FACULTY OF ENGINEERING, TARSUS UNIVERSITY, MERSIN, TURKEY

E-mail address: bugrasarper@tarsus.edu.tr

ULUSOY DENİZCİLİK, İSTANBUL, TURKEY

E-mail address: servetuzelo@gmail.com

DITAS DENİZCİLİK, İSTANBUL, TURKEY

E-mail address: nedimkizilkaya@outlook.com

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 259

APPROXIMATE SOLUTIONS OF SOME FREDHOLM INTEGRAL EQUATIONS ASSOCIATED WITH LUCAS POLYNOMIALS

Ç. TÜRKÖĞLU AND M. GÖCEN

ABSTRACT

In this study, we seek the approximate solutions of some second kind Fredholm integral equations by using Lucas polynomials with hat basis functions. We also present certain numerical examples to support our theoretical results.

REFERENCES

- [1] A. Chakrabarti, S.C. Martha, Approximate solutions of Fredholm integral equations of the second kind, Appl. Math. and Comput., 211 459-466 (2009).
- [2] B. N. Mandal, S. Bhattacharya, Numerical solution of some classes of integral equations using Bernstein polynomials, Appl. Math. and Comput. 190 1707-1716 (2007).
- [3] M. Nadir, Solving linear integral equations with Fibonacci polynomials. Malaya Journal of Matematik, 6(4) 711-715 (2018).
- [4] M. Nadir, M. Chemcham, Numerical solution of linear integral equations using hat function basis, Asian Journal of Math. and Comp. Research, 15(1) 1-8 (2017).
- [5] M. Nadir, M. Dilmi, Euler series solutions for linear integral equations, The Australian Journal of Math. Anal. and Appl., 14(2) 1-7 (2017).
- [6] A. M. Rocha, J. S. Azevedo, S. P. Oliveira, M. R. Correa, Numerical analysis of a collocation method for functional integral equations, Appl. Num. Math., 134 31-45 (2018).

(Ç. Türkoğlu) ZONGULDAK BULENT ECEVİT UNIVERSITY, GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES, 67100 ZONGULDAK, TURKEY

Email address, Ç. Türkoğlu: caglaturkoglu1@gmail.com

(M. Göcen) ZONGULDAK BULENT ECEVIT UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF MATHEMATICS, 67100 ZONGULDAK, TURKEY

Email address, M. Göcen: gocenm@hotmail.com

Date: may 1, 2021, accepted may 7, 2021.

2000 Mathematics Subject Classification. Primary 45A05, 45B05, 45D05.

Key words and phrases. Linear integral equation, Lucas polynomials, Collocation methods, Approximate solution.

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 260-261

A PERFORMANCE ANALYSIS OF ATTACK INDIVIDUAL PENSION FUNDS BY A SYSTEM DYNAMICS SIMULATION APPROACH

MUHAMMED ORDU

0000-0003-4764-9379

ABSTRACT

The individual pension system has been developed to overcome the shortcomings of the existing social security systems and is still used in many countries. This system, which aims to increase the living standards of individuals during their retirement and to earn additional income in addition to their retirement income, includes incentives to ensure that the participant stays in the system for a long time. In this context, participants who make long-term investments benefit from many advantages such as tax withholding, high state contribution rate and entrance fee exemption. At the same time, 30% of each contribution paid regularly by the participant is invested in the participant's account as state contribution. Companies operating in the individual pension system develop pension plans for participants in different risk groups. In this study, a simulation model was established by using system dynamics approach, taking into account the components of the Turkish individual pension system. By this simulation model, the performances of pension mutual funds (i.e., first public external debt instruments fund, second public external debt instruments fund and developed countries variable fund) in the attack risk group of an individual pension company operating in Turkey were analyzed under different scenarios. In the study, the data of the relevant company between 2015 and 2020 were used. The performances of three different attack pension mutual funds were analyzed under scenarios consisting of five different investment periods, in which the advantages and deductions of the individual pension system were taken into account. As a result, no fund is profitable in the short term, and an investment with an investment period of at least 36 months is the right option. It is predicted that the first public external debt instruments and developed countries variable funds are more profitable than the second public external debt instruments fund in the 72- and 120-month investment period. In the last scenario, in which a participant invests in the system by meeting all the conditions, it has been determined that the pension mutual fund, which consists of the first public external debt instruments fund, is more preferable. This simulation model developed in the study can be used effectively by all stakeholders of the individual pension system, and the participants will be able to choose more appropriate funds by comparing pension mutual funds.

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Individual Pension System, Attack Pension Investment Fund, System Dynamics, Simulation, Performance Analysis

REFERENCES

- [1] Ordu, M. A Simulation-Based Decision-Making Approach to Evaluate the Returns on Investments, *International Journal of Simulation Modelling*, 21(3), 441-452, (2022).
- [2] Mutlu, Ö., Ordu, M. & Polat, O. Comparison of individual pension system and bank's deposit system for low-risk investors, *Alphanumeric Journal*, 4(2), 95–114, (2016).

OSMANIYE KORKUT ATA UNIVERSITY, FACULTY OF ENGINEERING, DEPARTMENT OF INDUSTRIAL ENGINEERING,
80010, OSMANIYE, TURKEY

E-mail address: muhammedordu@osmaniye.edu.tr

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 262

STRUCTURAL ANALYSIS DEVELOPMENT STUDY OF THE REAR COVER USED IN THE TRAILER VEHICLE

ONUR CAN KIRIT MEHMET VURGUN

Abstract

The durability and sustainability of semi-trailer vehicles, which are among the locomotive products of today's transportation system, are important for the user. Trailers with high quality and solid construction both provide prestige for the manufacturer and enable the users to use the vehicle with confidence.

With the opening of the rear door on the trailer, forklift entry into the trailer is provided. Durable and safe structure design is important to minimize the chassis damage that may occur at the forklift entrance[1]. In this study, the structural analyzes of various rear cover geometries were examined and these designs were compared within each other. Model design was carried out with Catia V5 program and analysis studies were carried out in Ansys Workbench.

REFERENCES

- [1] Ning-Xu, M.A. & Ueda, Y. & Murakawa, H. & Maeda, H. (1995) FEM analysis of 3D welding Residual Stresses and Angular Distortion in T-type fillet welds. JWRI, 24, 115-122.

KOLUMAN AUTOMOTIVE INDURSTY , MERSİN, TURKEY
can.kirit@koluman.com mehmet.vurgun@koluman.com

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Semi-Trailer, Rear Cover, Structural Analysis, Ansys, Catia V5

REDUCING THE USE OF HIGH-STRENGTH SHEET METAL IN TIMBER CARRIER SEMI-TRAILER VEHICLES

MEHMET VURGUN, CANUR CAN KIRIT

ABSTRACT

The timber carrier vehicles in the Semi-trailer product group are vehicles that are produced without curtains and have replaceable support parts in their superstructure. The product is especially used for the transportation of cylindrical and irregular loads. As the usage areas are off-road conditions, axle manufacturers do not approve the use of standard axle combinations. The axle combinations used are presented in reinforced axle status. Apart from the load factor of the vehicle, there are risk factors arising from the conditions of use. The first of these is the irregularity of vehicle loading conditions. Irregularities are loadings by dropping loads from high points (3000-4000 mm) and dynamic force changes due to this[1].

The work done; It is a set of analyzes and controls that will ensure the use of standard sheets that are easy to supply from the market, instead of high-strength sheets, by ensuring a minimum increase in the chassis weight by paying attention to the conditions of use. Model design was carried out with Catia V5 program and analysis studies were carried out in Ansys Workbench.

REFERENCES

- [1] Mäkinen, P. 2001. Competitive strategies applied by Finnish timber carriers following deregulation. *Silva Fennica* 35(3): 341-353.

KOLUMAN AUTOMOTİVE İNDURSTY ,MERSİN, TURKEY

mehmet.vurgun@koluman.com can.kirit@koluman.com

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Semi-Trailer, Timber Carrier, Structural Analysis, Ansys, Catia V5

IMPACT SLIDING WEAR BEHAVIOUR OF THERMALLY OXIDIZED Ti-6Al-4V ALLOY

AYŞENUR EĞER ÖĞLU AND HARUN MİNDİVAN

0009-006-9825-1-000 and 0000-0003-3948-253X

ABSTRACT

Titanium alloys are promising lightweight materials that have the potential to replace the current use of stainless steels in applications involving engine valves; however, their wear resistance needs to be improved. In this study, Ti-6Al-4V was thermally oxidized (TO) at 600 °C for 60 h to create a surface rutile, TiO₂ layer with a hardened oxygen diffusion zone. Using a dedicated laboratory-scale impact-sliding wear test, the wear behavior of untreated Ti-6Al-4V and TO-Ti-6Al-4V was examined against SAE 52100-grade bearing steel balls. The thermal oxidation caused a decrease in the wear rate at the impact and sliding zones of the wear track.

REFERENCES

- [1] Yazdaniyan, M.M., Edrisy, A., Alpas, A.T. (2007). Vacuum sliding behaviour of thermally oxidized Ti-6Al-4V alloy, *Surface & Coatings Technology*, 202, 1182-1188.
- [2] Lou, M., Alpas, A.T. (2019). High temperature wear mechanisms in thermally oxidized titanium alloys for engine valve applications. *Wear*, 426-427, 443-453.
- [3] Ibrahim, MK., Kaba, M., Muhaffel, F., Agaogullari, D., Cimenoglu, H. (2022). Thermal oxidation of a porous Ti-23Nb alloy for wear related biomedical applications: Effect of oxidation duration. *Surface & Coatings Technology*, 439, 1-10.
- [4] Marin, E., Offoiach, R., Regis, M. Fusi, S., Lanzutti, A., Fedrizzi, L. (2016). Diffusive thermal treatments combined with PVD coatings for tribological protection of titanium alloys. *Materials and Design*, 89, 314-322.
- [5] Duan, Y., Li, P., Chen, Z., Shi, J., Ma, L. (2018). Surface evolution and growth kinetics of Ti6Al4V alloy in pack boriding. *Journal of Alloys and Compounds*, 690-701.
- [6] Cetiner, D., Atar, E., Derin, B., Cimenoglu, H. (2020). Thermal oxidation of cold sprayed Ti-5Al-XZn coatings for tribological applications. *Materials Letters*, 274, 1-5.
- [7] Aniolek, K. Kupka, M. (2019). Mechanical, tribological and adhesive properties of oxide layers obtained on the surface of the Ti-6Al-7Nb alloy in the thermal oxidation process. *Wear*, 432-433, 1-14.

Date: July 08, 2023

2000 Mathematics Subject Classification. Primary 90B50; Secondary 03B52.

Key words and phrases. Ti-6Al-4V alloy, Thermal oxidation, Wear resistance.

- [8] García-Rueda, A.K., Guzman-Castillo, D., García-Gonzalez, L., Zamora-Peredo, L., Hernandez-Torres, J. (2022). Surface modification of a Ti6Al4V alloy by thermal oxidation to improve its tribological properties. *Materials Letters*, 317, 1-4.
- [9] El Bakali, A., Gilblas, R., Pottier, T., Lieurey, A., Le Maout Y. (2021). Effect of oxidation on spectral and integrated emissivity of Ti-6Al-4V alloy at high temperatures. *Journal of Alloys and Compounds*, 889, 1-11.
- [10] Aniolek, K., Kupka, M., Barylski, A. (2016). Sliding wear resistance of oxide layers formed on a titanium surface during thermal oxidation. *Wear*, 356-357, 23-29.
- [11] Wang, S., Liao, Z., Liu, Y., Liu, W. (2014). Influence of thermal oxidation temperature on the microstructural and tribological behavior of Ti6Al4V alloy. *Surface & Coatings Technology* 240, 470-477.
- [12] Nie, Y., Zhang, J. (2013). Cyclic impact-sliding fatigue wear resisting treatment, Patent No: US 8402,811 B2.

DEPARTMENT OF MECHANICAL ENGINEERING, FACULTY OF ENGINEERING, BILECIK ŞEYH EDEBALI UNIVERSITY,
BILECIK, 11230, TURKEY
E-mail address:aysenur.egercioglu@bilecik.edu.tr

DEPARTMENT OF MECHANICAL ENGINEERING, FACULTY OF ENGINEERING, BILECIK ŞEYH EDEBALI UNIVERSITY,
BILECIK, 11230, TURKEY
E-mail address:harun.mindivani@bilecik.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 266-267

SIMILARITY MEASURE IN BIPOLAR FUZZY SETS AND ITS APPLICATION TO MULTI-ATTRIBUTE DECISION MAKING METHOD

G. SEVER AND Z. ZARARSIZ

ABSTRACT

One important element in resolving difficulties in practical situations is the idea of bipolarity. A bipolar fuzzy set (BFS) is a powerful mathematical tool for dealing with unpredictability and uncertainty in real-world issues. In this study, we present new similarity metrics (SMs) based on specific BFS (bipolar fuzzy sets) characteristics. Additionally, appropriate numerical examples are used to explain the proposed SMs. A novel multi-attribute decision-making algorithm (MADM) and accompanying flow diagram are being developed. Furthermore, a comparison of the suggested method with some of the current similarity measures is made in order to establish the validity of the proposed MADM method. Beyond the implementation perspective, the proposed proposal has a lot of potential. Extensions of fuzzy sets could be modified slightly to implement the proposed metric in an efficient manner.

REFERENCES

- [1] Y. Han, Z. Lu, Z. Du, Z. Luo and S. Chen, A Yin Yang bipolar fuzzy cognitive TOPSIS method to bipolar disorder diagnosis, *Computer Methods and Programs in Biomedicine*, Vol.158, pp.1-10 (2018).
<https://doi.org/10.1016/j.cmpb.2018.02.004>
- [2] D. Molodtsov, Soft set theory-first results, *Comput. Math. Appl.*, Vol.37, pp.19-31 (1999).
[https://doi.org/10.1016/S0898-1221\(99\)00056-5](https://doi.org/10.1016/S0898-1221(99)00056-5)
- [3] W. R. Zhang, Bipolar fuzzy sets and relations: a computational framework for cognitive modeling and multiagent decision analysis, *NAFIPS/IFIS/NASA94, Proceedings of the First International Joint Conference of The North American Fuzzy Information Processing Society Biannual Conference, America*, pp.305-309 (1994).
DOI:10.1109/IJCF.1994.375115
- [4] W. R. Zhang, Bipolar fuzzy sets, *Proceedings of IEEE International Conference on Fuzzy Systems*, pp. 835-840 (1998).
DOI:10.1109/FUZZY.1998.687599
- [5] M. A. Alghamdi, N. O. Alshehri and M. Akram, Multicriteria decision-making methods in bipolar fuzzy environment, *Int. J. Fuzzy Syst.* Vol.20, pp.20-57 (2018).
DOI: 10.1007/s40815-018-0499-y

Date: July, 8, 2023.

Key words and phrases. Bipolar fuzzy set, similarity measure, multi-attribute decision-making.

[6] P. Majumdar and S. K. Samanta, Similarity measure of soft sets, New Math. Nat. Comput. Vol.4, pp.1-12 (2008).

DOI: 10.1142/S1793005708000908

NEVŞEHİR HACI BEKTAŞ VELİ UNIVERSITY, DEPARTMENT OF MATHEMATICS, 50300,
NEVŞEHİR, TURKEY

Email address: gozdesvr33@gmail.com

NEVŞEHİR HACI BEKTAŞ VELİ UNIVERSITY, DEPARTMENT OF MATHEMATICS, 50300,
NEVŞEHİR, TURKEY

Email address: zarifezararsiz@nevsehir.edu.tr

UNCORRECTED

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 268-269

PREDICTION OF COVID-19 CASES USING UNIDIRECTIONAL LSTM, BIDIRECTIONAL LSTM AND DEEP NEURAL NETWORK APPLICATIONS

BAHAR SAĞIN and BÜŞRA DEMİRBAŞ

ABSTRACT

The COVID-19 pandemic has caused a worldwide health problem that has presented a lot of difficulties to the global healthcare sector, governments, and societies since management and control of the pandemic depend heavily on accurate estimates of the disease's spread and severity. This thesis investigates the application of deep learning models, such as Uni-LSTM, Bi-LSTM and DNNs, for COVID-19 prediction. It gathers and examines actual data from various nations, such as figures for cases, hospitalizations, and fatalities. Deep learning models train and evaluate the data, comparing the results based on metrics like accuracy, precision, re-call, and support. The study's findings demonstrate that Bi-LSTM outperforms other models in accurately predicting the spread and severity of the disease. This study recommends using a deep learning-based approach to recognize Covid-19 and no-finding occurrences in chest X-ray images and CT scans. It sheds light on applying LSTM and DNN systems for COVID-19 prediction. It emphasizes the significance of data quality and quantity in achieving accurate and trustworthy predictions. The classification performance of the trained models was evaluated using the above metric.

REFERENCES

- [1] Yamin, M. *Counting the cost of COVID-19. International journal of information technology*, 12(2), 311-317. 2020.
- [2] Duran-Lopez, L., Dominguez-Morales, J. P., Corral-Jaime, J., Vicente-Diaz, S., & Linares-Barranco, A. . *COVID-XNet: A custom deep learning system to diagnose and locate COVID-19 in chest X-ray images. . s.l. : Applied Sciences*, 10(16), 5683., 2020.
- [3] Tsang, H. F., Chan, L. W. C., Cho, W. C. S., Yu, A. C. S., Yim, A. K. Y., Chan, A. K. C., ... & Wong, S. C. C. *An update on COVID-19 pandemic: the epidemiology, pathogenesis, prevention and treatment strategies. Expert review of anti-infective therapy*, 19(7), 877-888. 2021.
- [4] Kumar, R. L., Khan, F., Din, S., Band, S. S., Mosavi, A., & Ibeke, E. *Recurrent neural network and reinforcement learning model for COVID-19 prediction. Frontiers in public health*, 1437. 2021.
- [5] Santosh, K. C., & Gaur, L. *Artificial intelligence and machine learning in public healthcare: Opportunities and societal impact. Springer Nature*. 2022.
- [6] Bahad, P., Saxena, P., & Kamal, R. *Fake news detection using bi-directional LSTM-recurrent neural network. Procedia Computer Science*, 165, 74-82. 2019.

Date: July, 8, 2023.

- [7] Dairi, A., Harrou, F., Zeroual, A., Hittawe, M. M., & Sun, Y. . *Comparative study of machine learning methods for COVID-19 transmission forecasting*. *Journal of Biomedical Informatics*, 118, 103791. 2021.
- [8] Rodríguez, A., Tabassum, A., Cui, J., Xie, J., Ho, J., Agarwal, P., ... & Prakash, S. A. . *Deepcovid: An operational deep learning-driven framework for explainable real-time covid-19 forecasting*. In *Proceedings of the AAAI Conference on Artificial Intelligence (Vol. 35, No. 17, pp. 15393-15400)*. 2021.
- [9] Hariri, R. H., Fredericks, E. M., & Bowers, K. M. *Uncertainty in big data analytics: survey, opportunities, and challenges*. *Journal of Big Data*, 6(1), 1-16. 2019.
- [10] Chimmula, V. K. R., & Zhang, L. *Time series forecasting of COVID-19 transmission in Canada using LSTM networks*. *Chaos, Solitons & Fractals*, 135, 109864. 2020.
- [11] Rauf, H. T., Lali, M. I. U., Khan, M. A., Jadhry, S., Alolaiyan, H., Razaq, A., & Irfan, R. *Time series forecasting of COVID-19 transmission in Asia Pacific countries using deep neural networks*. *Personal and Ubiquitous Computing*, 1-18. 2021.
- [12] Widiputra, H., Mailan, Kay, ..., & Gautama, E. . *Multivariate cnn-lstm model for multiple parallel financial time-series prediction*. *Complexity*, 2021, 1-14. 2021.
- [13] Chandra, R., Jain, A., & Singh Chauhan, D. *Deep learning via LSTM models for COVID-19 infection forecasting in India*. *PloS one*, 17(1), e0262708. 2022.
- [14] Mirzaee, S., Kafiel, R., Sonka, M., Yazdani, S., & Soufi, G. J. *Deep-COVID: Predicting COVID-19 from chest X-ray images using deep transfer learning*. *Medical image analysis*, 65, 101794. 2020.
- [15] Seidel, R., Apitzsch, A., & Hirtz, G. . *Improved person detection on omnidirectional images with non-maxima suppression*. *arXiv preprint arXiv:1805.08503*. 2018.
- [16] Shahin, A. I., & Almotairi, S. 2021. *A deep learning BiLSTM encoding-decoding model for COVID-19 pandemic spread forecasting*. *Fractal and Fractional*, 5(4), 175.
- [17] Verma, H., Mandal, S., & Gupta, A. . *Temporal deep learning architecture for prediction of COVID-19 cases in India*. *Expert Systems with Applications*, 195, 116611. 2022.
- [18] Siarni-Namini, S., Tavakoli, N., & Namin, A. . *A comparative analysis of forecasting financial time series using arima, lstm, and bilstm*. *arXiv preprint arXiv:1911.09512*. 2019.
- [19] An, Q., Tao, Z., Xu, X., El Mansori, M., & Chen, M. *A data-driven model for milling tool remaining useful life prediction with convolutional and stacked LSTM network*. *Measurement*, 154, 107461. 2020.
- [20] Sivanandhini, P., & Prakash, J. *Crop yield prediction analysis using feed forward and recurrent neural network*. *International Journal of Innovative Science and Research Technology*, 5(5), 1092-1096. 2020.
- [21] Hinton, G., Deng, L., Yu, D., Dahl, G. E., Mohamed, A. R., Jaitly, N., ... & Kingsbury, B. *Deep neural networks for acoustic modeling in speech recognition: The shared views of four research groups*. *IEEE Signal processing magazine*, 29(6), 82-97. 2022.
- [22] López-Cabrera, J. D., Orozco-Morales, R., Portal-Díaz, J. A., Lovelle-Enríquez, O., & Pérez-Díaz, M. . *Current limitations to identify COVID-19 using artificial intelligence with chest X-ray imaging*. *Health and Technology*, 11(2), 411-424. 2021.

ANKARA YILDIRIM BEYAZIT UNIVERSITY, ANKARA, TURKEY
E-mail address: demirbasbusra@gmail.com

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 270-271

ULTRASONIC PILOT REACTOR DESIGN: TEMPERATURE, PRESSURE AND ROTARY CONTROL CAN BE USED IN THE PRODUCTION OF HYGROSCOPIC MATERIALS

S. KOŞE, F. ULUSAL, and S. H. YETGİN

0000-0002-6224-3388, 0000-0001-6926-6251 and 0000-0002-6068-9204

ABSTRACT

Materials such as zinc chloride, sodium chloride, sodium hydroxide, magnesium oxide and calcium oxide retain water by means of diffusion and absorption into their crystals due to their chemical structure. Such materials are called hygroscopic materials and are used for both liquids and solid substances [1]. Normally, there is about 0.2-4 percent water vapor by mass in the air depending on the air temperature and ambient conditions. When hygroscopic materials come into contact with air/ atmosphere, they absorb water vapor and become moist. This makes it very difficult to produce, store, and use hygroscopic materials. Although special closed systems should be used for the production of hygroscopic materials, it is necessary to remove the water entering the medium or absorbed by the substance from the environment and reaction chambers at high temperatures are required for calcination processes [1-4]. However, there should be a mechanical mixing system in order to prevent mold formation during uniform heating and drying. In order to prevent the removal of gases arising during the reaction of hygroscopic materials from the environment or the humidification of the product, it is necessary to remove water vapor from the system or to carry out a continuity with an inert gas. In the hygroscopic material production systems used in the market, problems such as agglomeration of powders, adhesion of powders to the walls and high energy requirements are observed. In addition, the bulky structure and limited production capacities of these systems are another problem. With this study, a device to be used in the production of a new hygroscopic material was designed. In our study, first of all, the devices used in the market were investigated and the data to be used in the comparison of the system we will design were obtained. While hygroscopic materials are processed with mechanical mixers in conventional systems, air mixing units are used in the new system. Ultrasonic vibration parts are assembled on the surfaces of mixing tubes, to prevent agglomeration in the materials. Instead of the cylindrical mixing unit, particles were sent with hot air inside the pipes to prevent material sticking to the walls. Design studies were carried out in a computer-aided design program. The efficiency of the system was measured numerically by making

Date: July, 8, 2023.

Key words and phrases. Hygroscopic materials, Reactor design, Hygroscopic material sizing.

data obtained, a new system that is %42 lighter and %50 smaller in size compared to the existing systems has been designed. Compared to comparison systems, it has at least %38 more product processing capacity, and energy use is reduced by %25.

REFERENCES

- [1] Jiyuan Liang, Xuelai Zhang, Jun Ji, Hygroscopic phase change composite material—A review, *Journal of Energy Storage*, Vol.36, (2021).
DOI <https://doi.org/10.1016/j.est.2021.102395>
- [2] Olalekan F. Osanyintola, Carey J. Simonson, Moisture buffering capacity of hygroscopic, Vol.38, 10, pp:1270-1282, (2006).
DOI <https://doi.org/10.1016/j.enbuid.2006.03.026>.
- [3] Fangfang Deng, Chenxi Wang, Chengde Xiang, Ruzhu Wang, Bioinspired topological design of super hygroscopic complex for cost-effective atmospheric water harvesting, *Nano Energy*, Vol. 90, B, (2021).
DOI <https://doi.org/10.1016/j.nanoen.2021.106642>.
- [4] Wang, W., et al., An Overview of Adsorbents in the Rotary Desiccant Dehumidifier for Air Dehumidification, *Drying Technology*, Vol.31, 12, pp:1334-1345, (2013).
DOI <https://doi.org/10.1080/07373937.2013.792094>

TARSUS UNIVERSITY, MECHANICAL AND METAL TECHNOLOGY DEPARTMENT, 33100, MERSIN, TÜRKİYE
E-mail address: sinankose@tarsus.edu.tr

TARSUS UNIVERSITY, CHEMISTRY AND CHEMICAL PROCESS TECHNOLOGIES DEPARTMENT, 33100,
MERSIN, TÜRKİYE
E-mail address: fatmaulusal@tarsus.edu.tr

TARSUS UNIVERSITY, MECHANICAL ENGINEERING DEPARTMENT, 33100, MERSIN, TÜRKİYE
E-mail address: shakanyetgin@tarsus.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 272-273

FIXED-POINT THEOREMS VIA FUZZY-INTERPOLATIVE KANNAN-TYPE CONTRACTION

MERYEM ŞENOCAK

0000-0002-2988-9419

ABSTRACT

In this article, fuzzy interpolative Kannan-type contraction is defined and then a theorem is proved that provides the existence of a fixed point for this contraction in both fuzzy metric spaces and extended fuzzy metric spaces. With new concepts and new theorems, a generalization of the existing ones in the literature has been obtained.

REFERENCES

- [1] Banach, S., 1922. Sur les opérations dans les ensembles abstraits et leur application aux équations intégrales, Fund Math., 3; 137-181.
- [2] George, A., Veeramani, P., 1994, On some results in fuzzy metric spaces, Fuzzy Sets and Systems, 64;395-399, [http://dx.doi.org/10.1016/0165-0114\(94\)90162-7](http://dx.doi.org/10.1016/0165-0114(94)90162-7).
- [3] Gopal, D. and Vetro, C., 2014, Some new fixed point theorems in fuzzy metric spaces, Iranian Journal of Fuzzy Systems, 11(3); 95-107.
- [4] Grabiec, M., 1988, Fixed points in fuzzy metric spaces, Fuzzy Sets and Systems, 27;385-389, [https://doi.org/10.1016/0165-0114\(88\)90064-4](https://doi.org/10.1016/0165-0114(88)90064-4).
- [5] Gregori, V., Minana, J. J. and Miravet, D., 2019, Extended fuzzy metrics and fixed point theorems, Mathematics Journal, 7,303, <https://doi.org/10.3390/math7030303>.
- [6] Gregori, V., Romaguera, S., 2014, Characterizing completable fuzzy metric spaces, Fuzzy Sets and Systems, 144;411-420, DOI:10.1016/S0165-0114(03)00161-1.
- [7] Gregori, V., Sapena, A., 2002, On fixed point theorems in fuzzy metric spaces, Fuzzy Sets and Systems, 125;245-252, [https://doi.org/10.1016/S0165-0114\(00\)00088-9](https://doi.org/10.1016/S0165-0114(00)00088-9).
- [8] Istratescu, V. 1974, An introduction to theory of probabilistic metric spaces with applications, Ed Tehnica, Bucuresti, Romanian.

Date: July, 8, 2023.

- [9] Kannan, R., 1968, Some results on fixed points. Bull Calcutta Math. Soc. 60;71-76.
- [10] Karapınar, E., 2018, Adv. Theory Nonlinear Anal. Appl. 2;85-87.
- [11] Kramosil, I., Michalek, J., 1975, Fuzzy metrics and statistical metric spaces, Kybernetika, 11;336-344.
- [12] Mihet, D., 2008, Fuzzy ψ - contractive mappings in non-Archimedean fuzzy metric space, Fuzzy Sets and Systems, 159;739-744. 10, <https://doi.org/10.1016/j.fss.2007.07.006>.
- [13] Senocak, M., Güner, E., 2023, Fixed-point theorems in extended fuzzy metric spaces via $\alpha - \phi - M^0$ - and $\beta - \psi - M^0$ -fuzzy contractive mappings, Communications Faculty of Sciences University of Ankara Series A1: Mathematics and Statistics, DOI:10.31801/cfsuasmas.1038245.
- [14] Senocak, M., Güner, E., 2023, Some Fixed-point Theorems in Extended Fuzzy Metric Spaces, Erzincan University Journal of Science Technology, DOI:10.18185/erzifbed.114694.
- [15] Schwizer, B., Sklar, A., 1960, Statistical metric spaces, Pacific Journal of Mathematics 10;315- 367.
- [16] Zadeh, L.A., 1965, Fuzzy sets, Inform. Control, 8;338-353.

ANKARA UNIVERSITY, ANKARA, TURKEY
E-mail address: meryemsnck@gmail.com

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 274-275

ANALYSIS OF HEATING AND COOLING DEGREE DAY VALUES FOR TRA2 REGION PROVINCES

Çiğdem KALTAKKIRAN

0000-0003-2502-0078

ABSTRACT

The information required for engineers and designers for energy calculations of buildings in Turkey can sometimes be limited. For this purpose, this study is performed to determine heating and cooling degree days for the provinces (Ağrı, Ardahan, Iğdır, Kars) of the TRA2 region in Turkey, using average temperature data obtained from the Turkish State Meteorological Service. Within the scope of the literature review, the base temperatures of 14, 16 and 18 °C for heating degree days and 20, 22 and 24 °C base temperatures for cooling degree days are determined. These analyses are important for architectural designs planned to be made in the provinces of the region, especially on insulation calculations, heating, cooling and air conditioning. It is very important to benefit from these analyses at the point of improving expenditures such as the demand for energy on a global scale and therefore fuel expenses. The results of this study are presented through tables and graphs. At result, it is clearly observed that there is an increase in the heating degree days for all provinces with the increase in the base temperatures. At the same time, the cooling degree day values for all base temperatures in Kars and Ardahan provinces are zero, which means that no cooling is required. The order of the annual heating degree-day value for all base temperatures from highest to lowest is Ardahan, Kars, Ağrı, and Iğdır. Also, as the altitude of the provinces increases, the heating degree days increase while the cooling degree days decrease.

Date: July, 8, 2023.

Key words and phrases. Cooling degree day, Heating degree day, TRA2 region, Turkey

REFERENCES

- [1] Amber, K. P., Aslam, M. W., Ikram, F., Kousar, A., Ali, H. M., Akram, N., ... & Mushtaq, H. Heating and cooling degree-days maps of Pakistan. *Energies*, 11(1), 94, (2018).
- [2] Bakirci, K., Ozyurt, O., Karagoz, S., & Erdogan, S. Variable-base degree-day analysis for provinces of the Eastern Anatolia in Turkey. *Energy exploration & exploitation*, 26(2), 111-122, (2008).
- [3] Bulut, H., Buyukalaca, O., Yilmaz, T. "New outdoor cooling design data for Turkey." *Energy* 27(10):923-46, (2002).
- [4] Bulut, H., Büyükalaca, O., & Yılmaz, T. Türkiye için ısıtma ve soğutma derece-gün bölgeleri. In 16. National heat science and technique congress, (2007).
- [5] De Rosa, M., Bianco, V., Scarpa, F., & Tagliavini, L. A. Historical trends and current state of heating and cooling degree days in Italy. *Energy conversion and management*, 93, 323-335, (2015).
- [6] Dombaycı, A., Bayrakçı, H., & Özgür, A. Konutlarda soğutma enerjisi tüketiminin farklı baz sıcaklıkları için derece gün yöntemiyle tahmini. *Süleyman Demirel Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, 13(3), 311-314, (2009).
- [7] Dombaycı, Ö. A. Degree-day maps of Turkey for various base temperatures. *Energy*, 34(11), 1807-1812, (2009).
- [8] Işık, E., İnallı, M., & Çelik, J. ANN and ANFIS approaches to calculate the heating and cooling degree day values: The case of provinces in Turkey. *Arabian Journal for Science and Engineering*, 44, 7581-7597, (2019).
- [9] Kheiri, F., Fardipour, J. S., & Baltazar, J. C. Split-degree day method: A novel degree day method for improving building energy performance estimation. *Energy and Buildings*, 289, 113034, (2023).
- [10] Kureşci, N. A. Determination of optimum insulation thickness for building walls by using heating and cooling degree-day values of all Turkey's provincial centers. *Energy and buildings*, 118, 197-213, (2016).
- [11] Sahal, N. Proposed approach for defining climate regions for Turkey based on annual driving rain index and heating degree-days for building envelope design. *Building and Environment*, 41(4), 520-526, (2006).
- [12] Sha, H., Xu, P., Hu, C., Li, Z., Chen, Y., & Chen, Z. A simplified HVAC energy prediction method based on degree-day. *Sustainable Cities and Society*, 51, 101698, (2019).
- [13] Sarak, H., & Satman, A. The degree-day method to estimate the residential heating natural gas consumption in Turkey: a case study. *Energy*, 28(9), 929-939, (2003).
- [14] Usta, P., & Zengin, B. The energy impact of building materials in residential buildings in Turkey. *Materials*, 14(11), 2793, (2021).

ARDAHAN UNIVERSITY, ELECTRICAL-ELECTRONICS ENGINEERING

E-mail address: galipkaltakkiran@ardahan.edu.tr

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 276-277

THERMAL DIFFUSION-BASED BORIDING EFFECT ON HVOF-SPRAYED AISI 316L STAINLESS STEEL COATING

ÖZLEM T. ERMIŞ AND HARUN MİNDİVAN

0000-0001-6898-3865 and 0000-0003-3948-253X

ABSTRACT

Boriding is an effective method for increasing the surface hardness of materials and preventing wear. Boriding can result in a unique combination of bulk and surface characteristics. According to several research, the most influential factors for boron diffusion during the boriding process are defects and residual stresses in the crystal lattice. Because thermally sprayed coatings exhibit a significant degree of deformation due to particle impact, defects and stress are to be expected. The purpose of this study was to look into the effect of thermal diffusion-based boriding on the 316L coating applied by the HVOF technique. Hardness, wear resistance and coefficient of friction were improved by the boriding coating. Surface boriding has the ability to improve the coating's longevity.

REFERENCES

- [1] Kayali, Y., Büyüksagis, A., Yalçin, Y. Corrosion and wear behaviors of boronized AISI 316L stainless steel. *Metals and Materials International*, 19 (5), 1053-1061, (2013).
- [2] Kheyrodin, M., Habibolahzadeh, A., Babak Mousavi, S. Wear and corrosion behavior of duplex surface treated 316L austenitic stainless steel via combination of boriding and chromizing. *Protection of Metals and Physical Chemistry of Surfaces*, 53 (1)105-111, (2017).
- [3] Arteaga-Hernandez, L.A., Cuaio-Moreu, C.A. Gonzalez-Rivera, C.E., Alvarez-Vera, M., Ortega-Saenz, J. A., Hernandez-Rodriguez, M.A.L. Study of boriding surface treatment in the tribological behavior of an AISI 316L stainless steel. *Wear*, 477, 1-10, (2021).
- [4] Arslan, M., Karimzadehkhoei, M., Kartal Sireli, G., Coskun, O.K., Sert, M., Timur, S. Investigating growth of iron borides with the formation of monolithic Fe₂B Layer on AISI 304 stainless steel via cathodic reduction and thermal diffusion-based boriding. *Journal of Materials Engineering and Performance*, 3, 3274-3286, (2022).
- [5] Padmavathi, G., Sarada, B.N., Shanmuganathan, S.P., Padmini, B.V., Mohan, N. Effects of high velocity oxy fuel thermal spray coating on mechanical and tribological properties of materials-A review. *Materials Today: Proceedings*, 27, 2152-2157, (2020).

Date: July, 8, 2023.

Key words and phrases. AISI 316L, HVOF, boriding, wear.

[6] Park, G., Bae, G., Moon, K., Lee, C. Effect of plasma nitriding and nitro-carburizing on hvof-sprayed stainless steel coatings. *Journal of Thermal Spray Technology*, 22:1366-1373, (2013).

[7] Adachi, S., Ueda, N. Surface Hardness Improvement of Plasma-Sprayed AISI 316L Stainless Steel Coating by Low-Temperature Plasma Carburizing. *Advanced Powder Technology*, 24, 818-823, (2013).

[8] Adachi, S., Ueda, N. Combined plasma carburizing and nitriding of sprayed AISI 316L steel coating for improved wear resistance. *Surface & Coatings Technology*, 259, 44-49, (2014).

[9] Mindivan, F., Mindivan, H. Surface properties and tribocorrosion behaviour of a thermal sprayed martensitic stainless steel coating after pulsed plasma nitriding process. *Advances in Materials and Processing Technologies*, 2 (4), 514-526, (2016).

[10] Mindivan, H. High-Temperature Wear and Oxidation Behaviour of Electrochemically Borided Low Carbon Steel. *Journal of the Faculty of Engineering and Architecture of Gazi University* 38(2), 937-945, (2023).

[11] Mindivan, H. Pulsed plasma nitriding of high velocity oxy-fuel sprayed Inconel 625 coatings. *Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology*, 236 (10), 1950-1961, (2020).

DEPARTMENT OF MECHANICAL ENGINEERING, FACULTY OF ENGINEERING, BİLECİK ŞEYH EDEBALI
UNIVERSITY, BİLECİK, 11230, TURKEY

E-mail address: ermish67@hotmail.com

DEPARTMENT OF MECHANICAL ENGINEERING, FACULTY OF ENGINEERING, BİLECİK ŞEYH EDEBALI
UNIVERSITY, BİLECİK, 11230, TURKEY

E-mail address: harun.mindivan@bilecik.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 278

A NEW APPROACH TO GADOVAN NUMBERS

E. ÖZKAN¹, E. ESER² AND M. UYSAL³

0000-0002-4166-1148, 0000-0001-5965-4162 and 0000-0002-2362-3097

ABSTRACT

In this study, we give a new approach to Gadovan numbers. We represent the Binet formula, the generating functions, the exponential generating function of the new Gadovan numbers. Also, we obtain Cassini identity, Catalan identity, Vajda identity, Honsberger identity and D’ocagne identity for the new Gadovan numbers.

REFERENCES

- [1] Çelik, S., Durukan, İ., Özkan, E.: New recurrences on Pell numbers, Pell-Lucas numbers, Jacobsthal numbers, and Jacobsthal-Lucas numbers. *Chaos, Solitons & Fractals* 150: 111173 (2021). <https://doi.org/10.1016/j.chaos.2021.111173>
- [2] Deveci, O., & Shannon A. G.: Pell-Padovan-Circulant sequences and their applications. *Notes on Number Theory and Discrete Mathematics* 23(3),100-114 (2017).
- [3] Deveci, O., Karaduman, E.: On the Padovan p-numbers. *Hacettepe J. Math. Stat* 46(4), 579-592 (2017).
- [4] Diskaya, O., Menken, H.: Some Identities of Gadovan Numbers. *Journal of Science and Arts* 20(2), 317-322 (2020).

¹DEPARTMENT OF MATHEMATICS, ERZINCAN BINALI YILDIRIM UNIVERSITY, FACULTY OF ART AND SCIENCES, ERZINCAN, TURKEY

E-mail address: eozkan@erzincan.edu.tr, eozkanmath@gmail.com

²DEPARTMENT OF MATHEMATICS, ERZINCAN BINALI YILDIRIM UNIVERSITY, FACULTY OF ART AND SCIENCES, ERZINCAN, TURKEY

E-mail address: engineser1978@gmail.com

³DEPARTMENT OF MATHEMATICS, ERZINCAN BINALI YILDIRIM UNIVERSITY, FACULTY OF ART AND SCIENCES, ERZINCAN, TURKEY

E-mail address: mine.uysal@erzincan.edu.tr

Date: July, 8, 2023.

Key words and phrases. Gadovan numbers, Binet formula, Exponential Function, Generating functions, Cassini identity, Catalan identity.ved.

IFSCOM-E 2023

9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE

8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE

ISBN: 978-605-68670-9-5

pp: 279-280

**THE COMPARISON OF HYDRODYNAMICS DESIGNS OF DIFFERENT GEOMETRIES
IN RESTRICTED AND UNRESTRICTED FLUIDAL MEDIUMS WITH POTENTIAL**

MÜNİR CÜNÜR, S. AYDIN SALCI and SÜLEYMAN YİĞİT

0000-0002-3714-7044

ABSTRACT

In this study, the flow around redcell, perforated redcell, rankine oval, perforated rankine oval have been found out analytically and numerical within restricted and unrestricted fluidal medium and investigated in state of what is off-centered in restricted fluidal medium and subsequently they have been compared. The distribution of velocity and pressure of around them are compared and illustrated with matlab. When the perforated rankine oval is compared to redcell, perforated redcell, rankine oval, the pressure effecting the wall, though it creates the highest stability in redcell among all and some other disadvantages, it is understood that it has many more advantages in terms of usage and volume exist.

REFERENCES

- [1] BLAIR A., CAMPBELL R, GRANT P. T. A submersible fish cage that can be rotated on the surface to remove biofouling and for other purposes, 29, 177-184, (1982).
- [2] CARL ERIK, JANSON. Potential flow panel method for calculation of free surface flow with lift, Doctor savhandlingar vid chalmers Tekniska Hogskola, 1277 ISBN: 91-7197-469-5, (1997).
- [3] DJERİD H., BARAZA M., PERİN R., HARRAN G. Near wake turbulence properties around a circular cylinder at high Reynold number, Flow and Turbulance and Cumbustion, 71, 19-33, (2003).
- [4] DURGUN O. Kanallarda blokaj etkisinin belirlenmesi, İTÜ, Fen Bilimleri Enstitüsü, İstanbul, Doktora tezi, İstanbul, 002177, (1983).
- [5] GİLMANOV A., SOTİROPOULOS F. A hybrid cartesian immersed body method for simulating flows with 3D, geometrically complex, moving bodies, Journal of Computituonal Physics, 207, 457-492, (2005).

Date: July, 8, 2023.

Key words and phrases. Hydrodynamics design, perforated Rankine oval, Redcell, solid model with potential flow theory, uncommon vehicle, pressure design, submarine

- [6] HSU C. H., LIANG C. C., SHIAH S. W. AND JEN C. Y. A study of stress concentration effect around penetrations on curved shell and failure modes for deep-diving submersible vehicle, *Ocean Engineering*, **32**, 1098-1121, (2005).
- [8] HUGGINS A., PACKWOOD A. R. The optimum dimensions for a long-range, autonomous, deep-diving, underwater vehicle for oceanographic research, *Ocean Engineering*, **21**, 45-56, (1994).
- [9] [KOUH JEN-SHANG](#) [SUEN JYH-BIN](#). A 3D potential-based and designregularized high order panel method, *Ocean Engineering*, **28**, 1499-1516, (2001).
- [10] LI J. H., LEE P. M. [A neural network adaptive controller design for free-pitch-angle living behavior of an autonomous underwater vehicle](#), *Robotics and Autonomous Systems*, **52**, 132-147, (2005).
- [11] ZHIHUA, LIU YING, YONG CHENGXU, TU. Method to control unsteady force of submarine propeller based on the control of horseshoe vortex, *Journal of ship Research*, **56**, 12-22, (2012).
- [12] MADSEN H.Ø. CHRISTENSEN P., LAURIDSEN K. Securing the operational reliability of an autonomous mini-submarine, *Reliability Engineering & System Safety*, **68**, 7-16, (2000).
- [13] MAHFUZZ A.B. AND HADDARA M. R. Effect of the damping and excitation on the identification of the hydrodynamic parameters for an underwater robotic vehicle, *Ocean Engineering*, **30**, 1005-1025, (2003).
- [14] MACCEK C.P., KIM M. J., MOOK D. T. Three-Dimensional Potential Flow By A Vorticity- Panel Method, *Computers and Fluids*, 1992, **21**, 31-42, (1992).
- [15] NIÁZMAND H. AND RENKSÍZBULUT M. Surface effect on transient three-dimensional flow around rotating at moderate Reynolds numbers, *Computer and Fluids*, **32**, 1405-1433, (2003).
- [20] OHRING S. AND TELSTE J. The direct matrix imbedding technique for computing three-dimensional potential flow about arbitrarily shaped bodies, *Computer methods in Applied Mechanics and Engineering*, **21**, 315-336, (1980).
- [21] SUNER M., SALCI S.A., YIGIT K.S., KANDEMIR ILYAS. Analytical analysis of hydrodynamics of the perforated Rankine oval, *Ocean Engineering*, **108**, 227-240, (2015).

DEPARTMENT OF MECHANICAL, FACULTY OF ENGINEERING, TARSUS UNIVERSITY, MERSIN, TURKEY
E-mail address: msuner@tarsus.edu.tr

DEPARTMENT OF MECHANICAL, FACULTY OF ENGINEERING, ALTINBAS UNIVERSITY, ISTANBUL, TURKEY
E-mail address: aydin.salci@altinbas.edu.tr

DEPARTMENT OF MECHANICAL, FACULTY OF ENGINEERING, KOCAELI UNIVERSITY, KOCAELI, TURKEY
E-mail address: kyigit@kocaeli.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 281-282

**OPTIMIZING CO₂ LASER CUTTING PARAMETERS OF POLYETHYLENE
POLYMERIC MATERIAL USING HYBRID ENTROPY-TOPSIS APPROACH**

OĞUZHAN DEĞER, GÖKHAN BAŞAR and MUHAMMED ORDU

0000-0001-5373-1204, 0000-0002-9696-7579 and 0000-0003-4764-9379

ABSTRACT

Polyethylene (PE) stands out as an incredibly adaptable thermoplastic, commended for its high ductility and resilience against impact, making it an ideal material for various applications. In the present study, a CO₂ laser, known for its precision and effectiveness, is utilized for cutting PE, a technique of crucial importance to industries where precision is non-negotiable. Three parameters - surface roughness, kerf width, and material removal rate - have significant implications on the laser cutting process. Surface roughness, which impacts both the aesthetic appeal and functionality of the final product, and kerf width, which determines the accuracy of the cut, is of paramount importance. On the other hand, the material removal rate, an important efficiency indicator, holds crucial significance for industries where production speed is a key determinant of success. In an effort to explore and refine these parameters, our study involves the use of a CO₂ laser on 4 mm thick PE while controlling the power (at 80, 90, 100 W) and the cutting speed (at 5, 10, 15 mm/s). To determine the optimal parameters, we integrated the Entropy and TOPSIS methods, which helped in calculating the criteria weights as 29.80% for surface roughness, 4.64% for kerf width, and 65.56% for material removal rate and determining the optimal experimental condition. The optimal CO₂ laser cutting parameters were those where the minimal surface roughness and kerf width were achieved simultaneously with the maximal material removal rate. The results obtained specified the optimal conditions at 90 W power and 15 mm/s speed. This research significantly contributes to the PE cutting process, ensuring high quality while also serving as a valuable reference for future studies and advancements in this field.

Date: July, 8, 2023.

Key words and phrases. CO₂ Laser Cutting, Multi-Criteria Decision Making, Parameter Optimization, Polyethylene

REFERENCES

- [1] M. Ordu, O. Der, Environmental Impact-Based Thermoplastic Material Selection for Green Manufacturing: A Comparative Hybrid MCDM Approach, *Erciyes University Journal of Institute of Science and Technology*, 39, 100-115, (2023).
- [2] M. Ordu, Y. Fedai, A Novel Decision Support System Based on Fuzzy Multi Criteria Decision Making for Optimizing Machining Parameters, *Journal of Engineering Research*, (2023).
- [3] O. Der, S. Edwardson, M. Marengo, V. Bertola, Engineered composite polymer sheets with enhanced thermal conductivity, *IOP Conference Series: Materials Science and Engineering*, 613, 012008, (2019).
- [4] O. Der, M. Marengo, V. Bertola, (2021). Pulsating Heat Pipes: A Composite Polymer Sheet with Enhanced Thermal Conductivity. In: Wen, C., Yan, Y. (eds) *Advances in Heat Transfer and Thermal Engineering*. Springer, Singapore.
- [5] M. Ordu, O. Der, Polymeric Materials Selection for Flexible Pulsating Heat Pipe Manufacturing Using a Comparative Hybrid MCDM Approach, *Polymers*, 14 (13), 2933, (2023).

BANDIRMA ONYEDERELI UNIVERSITY, MARITIME FACULTY, DEPARTMENT OF MARINE VEHICLES
MANAGEMENT ENGINEERING, 10200, BANDIRMA, TURKEY
E-mail address: oder@bandirma.edu.tr

OSMANIYE KORKUT ATA UNIVERSITY, FACULTY OF ENGINEERING, DEPARTMENT OF INDUSTRIAL
ENGINEERING, 80010, OSMANIYE, TURKEY
E-mail address: gokhanbasar@osmaniye.edu.tr

OSMANIYE KORKUT ATA UNIVERSITY, FACULTY OF ENGINEERING, DEPARTMENT OF INDUSTRIAL
ENGINEERING, 80010, OSMANIYE, TURKEY
E-mail address: muhammedordu@osmaniye.edu.tr

IFSCOM-E 2023
9TH IFS AND CONTEMPORARY MATHEMATICS AND ENGINEERING CONFERENCE
8-11 JULY 2023, TARSUS, MERSİN, TÜRKİYE
ISBN: 978-605-68670-9-5
pp: 283

DESIGN OF LOAD LIFTING EYEBOLTS AND STANDARDIZATION WITH STATIC TESTS

YASİN AYĞUL and FURKAN DEMİRTAŞ

ABSTRACT

Load lifting eyebolts made by welding method are used for lifting and transporting raw materials, semi-finished products or finished products. Making the right choice according to the load capacity is important in terms of preventing negative consequences. In this study to verify the choice of load capacity; Preliminary designs of different types of eyebolts were created. Preliminary designs were subjected to Finite Element Analysis by determining the boundary conditions in the computer environment. Eye bolts designed in five types are fixed with the surface formed by the thickness of the weld seam. The load is applied according to the eyebolt types, which are pre-designed in a way to preserve the yield stress with a three-fold safety. According to the results of the analysis, improvements were made in the preliminary designs and they were finalized. All types of samples are produced for the final products and Koluman Otomotiv Endüstri A.Ş. Tensile test was applied in the quality laboratories of the company. As a result of this study; The static use of the products was investigated by comparing the Finite Element Analysis results with the Tensile test results. According to the results of the research, it is planned to use the products in standard form.

REFERENCES

- [1] REF 1-TS EN 10025-2 Hot rolled products of structural steels
- [2] REF 2-Bahar 2018 Çelik Yapılar 1 Munzur Üniversitesi İnşaat Müh.
- [3] REF 3-İmalat Yöntemleri II Prof.Dr. İrfan AY

KOLUMAN AUTOMOTIVE INDURSTY, MERSİN, TURKEY
E-mail address: yasin.aygul@koluman.com

KOLUMAN AUTOMOTIVE INDURSTY, MERSİN, TURKEY
E-mail address: furkan.demirtas@koluman.com

Date: July, 8, 2023.

Key words and phrases. Lifting Equipment, Finite Element Analysis, Tensile Testing, Design, Standardization, Welded Joining

8 JULY 2023

REGISTRATION (Face to Face)

OPENNING CEREMONY (Face to Face/Online)

Prof. Dr. Orhan Aydın

Assoc. Prof. Dr. Gökhan Çuvalcıoğlu

KEYNOTE SPEAKER

The Role of Engineering and Applied Sciences in Developing Innovative Energy Solutions

Prof. Dr. İbrahim Dinçer (Face to Face/Online)

Chair: Gökhan Çuvalcıoğlu

COFFEE BREAK

1. SESSION

HALL-A (Face to Face)-Mathematics

Chair: **Şehmus Fındık**

Generalization of Almost Primary and Nilary Ideals in Noncommutative Rings

Alaa Abouhalaka

Connected, Compact, and Sober Objects in ConLim

Kübra Çevik, Ayhan Erciyes

Dna Codes From Reversible Group Codes By A Virus Optimisation Algorithm

Adrian Korban, **Serap Şahinkaya, Deniz Üstün**

Fractional ECFGM(1,1) model with an application

Ümmügülsüm Erdinç, Halis Bilgil

HALL-B (Face to Face)-Engineering

Chair: **Buğra Sarper**

A Hybrid Deep Reinforcement Learning Algorithm Application For Vehicle Routing Problem

Meltem Atmış, Tolunay Göçken

Optimization of Gurney flap over NACA 0018 by using Surrogate Modeling

Emre Güler, Mehmet Erdem, Şihmehmet Yıldız, Melike Nikbay

The Comparison of Hydrodynamics Designs of Different Geometries in Restricted and Unrestricted Fluidal Mediums with Potential Flow and CFD

Munir Suner, S. Aydın Salcı, K. Suleyman Yigit

KEYNOTE SPEAKER

From Type-1, to Type-2 and Type-3 Fuzzy Systems: Theory and Applications

Prof. Dr. Oscar Castillo

Chair: Gökhan Çuvalcıoğlu

2. SESSION

HALL-A (ONLINE)-Mathematics

HALL-B (ONLINE)-Engineering

Chair: **Gökhan Çuvalcıoğlu**

Generators of F/R' Leibniz algebras

Zeynep Özkurt

Clique Matching Neighborhood Polynomial of Graph

Aldison M. Asdain, Rosalio G. Artes Jr.

Fren simplicial homotopy to crossed module homotopy

Hatice Gülsün Akay

Local Lower Separation Axioms In Q-Relaxive spaces

Samed Özkan

An Application Of Controlled Sets in Medical

Diagnosis

Sinem Tarsuslu(Yılmaz), Gökhan Çuvalcıoğlu

Chair: **Buğra Sarper**

Measurements And Evaluation Of Electric Field Exposure Generated By Modem in Home Environment

Mustafa Mutlu

The Effects Of Collector Plate Material On Fiber Fineness in Electrospinning

Gonca Şimşek Gündüz

Masked And Unmasked Face Recognition On Unconstrained Facial Images Using Hand-Crafted Methods

Ali Torbati, Önsen Toygar

Classification of Brain Tumors on MRI Images Using Deep Learning Architectures

Samaneh Sarfarazi, Önsen Toygar

9 JULY 2023

INVITED SPEAKER

On the Scattering Problem for a Non-Self-Adjoint Boundary Value Problem

Hasan Reşidođlu

Chair: Gökhan Çuvalcıođlu

COFFEE BREAK

Online Poster

Effect of production method on selected bioactive compounds and antioxidant activity of Japanese quince and quince fruit tinctures

Natalia Marat, Marzena Danowska-Oziewicz, Magdalena Polak-Śliwińska, Agnieszka Narwojsz

1. SESSION

HALL-A (Face to Face)-Mathematics

Chair: **Şehmus Fındık**

Best Approximation of Fixed Point Results in Generalized Metric Spaces
Nesrin Manav Tatar

Approximate Solutions Of The Modified Kratzer Potential Plus Screened
Coulomb Potential in N-Dimensions
Aysel Özfidan

A Novel Methodological Framework To Identify The Criteria For Decision-
Making Problems in Neutrosophic Fuzzy Environment
Ömer Faruk Görçün

HALL-B (Face to Face)-Engineering

Chair: **Buğra Sarper**

Corporate Carbon Footprint Calculation And Evaluation Of Mersin University Çiftlikköy Campus
Hasret KARAKAYA, Yasin ÖZAY, Nadir DİZGE

Active Packaging Films Incorporated With Essential Oils in Nanoemulsion Formulation
Natalia Marat, Aleksandra Purkiewicz, Didem Demir, Yasin Özay, Gulden Goksen

Smart Film Production By Including Bioactive Compounds
Aleksandra Purkiewicz, Natalia Marat, Didem Demir, Yasin Özay, Gulden Goksen

Using Fuzzy-Logic In Market Conditions For Efficient Portfolio Selection In The Casablanca Stock Exchange Abdelhamid Hamidi Alaoui	Determination Of Priority Areas For A Possible Underground Dam Around The Harşit Stream Basin Tuğba BOZKUS; Yusuf KAYA
--	--

COFFEE BREAK

2. SESSION	
HALL-A (ONLINE)-Mathematics	HALL-B (ONLINE)-Engineering
Chair: Gökhan Çuvalcıoğlu	Chair: Deniz Üstün
A Maximal Type Of Zagreb Index Büşra Aydın, Nihat Akgüneş	Biofuel Utilization in The Aviation Industry Emine Kahramaner, Özlem Ateş Duru
A Note On Higher Order Pell 2 ^s -IONS Hayrullah Özimamoğlu	Interaction Between Ret Protein Kinase And Curcumin And Resveratrol: A Molecular Docking Perspective Deniz Karataş
Some Properties Of Leonardo Sedenions Hayrullah Özimamoğlu	Second Order Model Reduction Of Higher Order Systems And Pid Controller Design Ali Yüce
Revolutionizing Matrix Computations: A Practical Approach For Efficient Calculation Of Matrix Sign Function Gül Karaduman	Automotive Industry Spare Parts Stock Management Abc Analysis Based Ahp Method Application Elife İrem Kal, Emel Yontar
Applications Of Selection, Determination And Decision Making in Education With The Help Of Fuzzy Logic Ali Sınar, Erhan Çetinkaya, Ahu Meryem Çuvalcıoğlu	
Examples And Applications Of Decision Making in The Field Of Education Using Intuitionistic Fuzzy Sets Erhan Çetinkaya, Ali Sınar, Ahu Meryem Çuvalcıoğlu	

LUNCH

INVITED SPEAKER

Challenges of PVT and Nano-based Thermal Property Enhancement of PVT-PCM Systems

Md. Hasanuzzaman

Chair: Bugra Sarper

POSTER FACE TO FACE

On An Eigenproblem Of The Fractional Sturm-Liouville Boundary Value Problem

Zeynep Geçit

3. SESSION

HALL-A (Face to Face)-mathematics

HALL-B (ONLINE)-Engineering

Chair: Şehmus Fındık

Chair: Serap Şahinkaya

Approximation By Bivariate Complex Sincus-Schurer Polynomials in Compact Disks

Nesibe Manav Mutlu

Evaluation Of Environmental, Social And Economic Performances Of 81 Provinces Of Turkey With Data Envelopment Analysis

Gökçen Bayram, Ayşe Hande Erol Bingöler, B. Gültekin Çetiner

Approximation By Generalization Of Bernstein-Schurer Operators

Nursel Çetin, Nesibe Manav Mutlu

A Literature Survey Based On The Tabu Search Heuristic Method For The Solution Of The Multi-Dimensional And Multi-Objective Knapsack Problem And Variations

Gürkan Güven Güner

On Translation Surfaces

Beyhan Yılmaz, Aykut Has

The Evaluation Of The Criteria To Be Taken into Account When Selecting Online Shopping Sites Based On Industry 4.0 With Using Dematel Method

Zeynep Durmaz, Erdem Aksakal

Fractional Approach To Some Fundamental Concepts Of Surface

Aykut Has, Beyhan Yılmaz

Optimizing CO2 Laser Cutting Parameters Of Polyethylene Polymeric Material Using Hybrid Entropy-Topsis Approach

Oğuzhan Der, Gökhan Başar, Muhammed Ordu

Subprojectivity Domain of Finitely Generated Modules

Arslan Yasin Shibeshi, Yılmaz Durğun

COFFEE BREAK

4. SESSION

HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Engineering	
Chair: Feride Tuğrul		Chair: Serap Şahinkaya	
Novel Inequalities For Generalized Fractional Integrals Applied To Synchronized Convex Functions Abdullah Akkurt , Hüseyin Yıldırım		A Solution To The Solid Transportation Problem Using Lr Flat Numbers Nuran Budak , Nuran Guzel	
On Kconformable Fractional Operators Sümeyye Ermeydan Çiriş , Hüseyin Yıldırım		A Compromise Solution To The Multi-Objective Solid Transportation Problem With The Uncertain Parameters Sedanur AKTÜRK , Nuran GÜZEL	
A Petrov-Galerkin Method For Solving The Generalized Equal Width Equation Yusuf Tatlisu , Seydi Battal Gazi Karakoc		Thermal Diffusion-Based Boriding Effect On Hvf-Sprayed Aisi 316l Stainless Steel Coating Bülent Ermiş , Harun Mindivan	
On Analytical Solutions Of Space-Time Fractional Variant Boursinesq Equation With Beta Derivative Nagehan Özdemir , Ayten Özkan		Sign Language Recognition Mobile Application For Turkish Language Erdem Demiroğlu , Furkan Ayakdaş, Asude Tanribuyurdu, Gülsüm Akkuzu Kaya	

COFFEE BREAK

5. SESSION

HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Engineering	
Chair: Arif Bal		Chair: Buğra Sarper	
Mixed İnteger Linear Programming Model For Optimizing University Exam Schedules Hamza Abunima , Burhan Pektaş, Nazmiye Kopacak, Özlem Şimşek		The Effects Of Cylindrical And Partial Pin Fins On The Cooling Performance Of A Minichannel Heat Sink Dondu Nur Turk , Kayhan Dagidir, Bugra Sarper, Orhan Aydın	
Complex Matrix Version Of Hybrid Numbers		A Performance Analysis Comparison Of Machine Learning Algorithms in Detection Of Heart Disease	

Çağla Ramis , Yasin Yazlık	Bahar Demirtürk, Bekir Can Elkenaroğlu
Generalized Kantorovich-Schurer-Type Operators Nursel Çetin	Investigation Of The Effect Of Nanoparticle Additives On The Refractive Index And Density Of Gasoline Mehmet Selman Gökmen , Mehmet Fatih Parlak, Hasan Aydoğan
Exact Solution Of The Schrodinger Equation in The Topologically Massive Space-Time Ali Tarsuslu , Kenan Söğüt	Simple Ways For Obtaining Transformation Matrices Of Serial Manipulators Osman Yavuz
On the Properties of the Xnorm Corresponding To The Minimum T-Norm Gul Karadeniz Gozeri , Sevilay Demir Saglam, and Gökhan Çuvalcıoğlu	

10 JULY 2023

1. SESSION

HALL-A (Online)-Mathematics

HALL-B (Online)-Engineering

Chair: **Gökhan Çuvalcıoğlu**

Chair: **Ali Özfidan**

A Fuzzy Soft Set-Based Approach To Identify Academic Dishonesty And Misconduct
Esra Korkmaz

Effect Of Different Build Orientations On Mechanical Properties Of Parts in Additive Manufacturing Technology
Derya Karaman And Hüccet Kahramanzade

Locally Recoverable Codes Based On The Matrices Derived From The Magic Squares
Rabia Zengin, Mehmet Emin Köroğlu

Pistachio Species Identification Using Histogram Of Oriented Gradient Descriptors And Support Vector Machine
Birkan Büyükarikan

Cyclic Dna Codes Over Mixed Alphabets
Tulay Yıldırım

An Innovative Approach for Enhancing Traffic Flow: Decentralized Traffic Signal Split Control Method
Serap Ergün

Finite Element Method For The Nonlocal Elliptic Problem With A \mathcal{H}^1 -Kirchhoff-Type Operator
Mahamat Saleh Daoussa Haggat, Mohamed Mbehou

Addressing the Challenge of Traffic Congestion: An Innovative Approach to Optimize Traffic Signal Control for Improved Traffic Flow
Serap Ergün

COFFEE BREAK

2. SESSION

HALL-A (Face to Face)-Mathematics	HALL-B (Online)-Engineering
Chair: Şehmus Fındık	Chair: Mümin Süner
On Derivations Of Free Bicommutative Algebras Şehmus Fındık	Applying The Artificial Bee Colony Algorithm: Enhancing The Efficiency Of A Hydrogen-Based Hybrid Renewable Energy System Ayhan Faah Güven
On Fuzzy Boolean Algebra With Respect To New Fuzzy Logic Conjunction Gökhan Çuvalcıoğlu, Gül Karadeniz Gözeri	Visit-Test: Designing Effective Visualization Literacy Assessment Test Elif E. Fırat
(α, β) -Interval Valued Intuitionistic Fuzzy Subgroups Arif Bal, Gökhan Çuvalcıoğlu	A Guideline To Designing Crowdsourced Online Experiments For Evaluating Visualization Literacy Elif E. Fırat
Approach To Intuitionistic Fuzzy Sets With Comparative Examples Of Decision Making Methods In Different Fields Feride Tuğrul, Mehmet Çitil, Gökhan Çuvalcıoğlu	Numerical Simulation Of Graphene/N-Ws ₂ /A-Si:H(I)/P-Csi/Ag Hit Solar Cells Nahide Karabulut, Büşra Aydın, Çağlar Duman

COFFEE BREAK

3. SESSION

HALL-A (Online)-Mathematics

HALL-B (Online)-Engineering

Chair: **Feride Tuğrul**

Chair: **Münir Süner**

A New Approach For Score Function On Q-Rung Orthopair Fuzzy Sets

Ali Köseoğlu

Investigation Of Convection Heat Transfer Coefficient Effects On Thermal Energy Storage Performance With

Pen/Graphite Matrix Composite
Özge Mutincik, Mustafa Yusuf Yazici

Convex Independent Common Neighborhood Polynomial Of Graphs

Amelia L. Arriesgado, Rosalio G. Artes Jr.

Impact Sliding Wear Behaviour Of Thermally Oxidized Ti-6Al-4V Alloy

Ayşenur Eğercioğlu, Harun Mindivan

On A General Inclusion Theorem

Hikmet Seyhan Özarlan And **Bağdagül Kartal**

Analysis Of Heating And Cooling Degree Day Values For Tra2 Region Provinces

Galip Kaltakkiran

Solvability And Guh Stability Results Of Fuzzy Nonlinear Abc-Fractional Coupled System

Aziz El Ghazouani, M'hamed Elomari And Sami Melliani

Investigating The Time-Domain Sensitivities To Nonlinear Hydrodynamic Interactions Of A Resonant Micro-Cantilever With Glycerol-Water Solutions in Multi-Frequency Operations

Cağrı Yılmaz

On Modeling on Multiplicative Calculus for Population Growth

Yusuf Ziya Altay, Ashi Bucak, **Sertaç Gökteş**

LUNCH

INVITED SPEAKER

ON INTUITIONISTIC FUZZY PRIMARY DECOMPOSITION OF INTUITIONISTIC FUZZY IDEALS

POONAM K. SHARMA

Chair: **Gökhan Çuvalcıoğlu**

POSTER FACE TO FACE

Robustness Control Circuit for Logic Circuit Integrations with PIC and Arduino Microcontrollers

Mehmet Ersin Aytarın, Derya Kayahan

Structural Analysis Development Study Of The Rear Cover Used in The Trailer Vehicle

Onur Can Kirit, Mehmet Vurgun

Reducing The Use Of High-Strength Sheet Metal in Timber Carrier Semi-Trailer Vehicles

Mehmet Vurgun, Onur Can Kirit

R58-03 Application in Aluminum Chassis

Mustafa YILMAZ, Akın ZENGİN, Onur Can KIRIT, Necip Ahmet KÖROĞLU

4. SESSION

HALL-A (Online)-Mathematics

Chair: **Arif Bal**

A Note On Fuzzy Product Rule
Tahir Ceylan

Fixed-Point Theorems Via Fuzzy-Interpolative Kannan Type Contraction
Meryem Şenocak

Positive Toeplitz Operators Between Harmonic Bloch Spaces On The Ball
Ömer Faruk Doğan

Existence Theorems For Set-Valued Operators in Wc-Banach Algebras
Cesim Temel And **Müberra Selah**

HALL-B (Face to Face)-Engineering

Chair: **Veysel Alcan**

An Encoding –Decoding Algorithm Based On Narayana Numbers
Engin Eser, **Bahar Kuloğlu** And Engin Özkan

New Number Sequences Built On Hybrid Numbers
Mine Uysal And Engin Özkan

A New Approach To Gadovan Numbers
Engin Özkan, **Engin Eser**, Mine Uysal

Microwave Energy-Based Hybrid Nanomaterial Preparation Approach For Energy Storage Purposes
Selçuk Poyraz

COFFEE BREAK**5. SESSION****HALL-A (Online)-Mathematics****HALL-B (Face to Face)-Engineering**Chair: **Şehmus Fındık**Chair: **Buğra Sarper**An Action Of Dihedral Group
Nazar Şahin ÖğüşlüMulti-Objective Optimizations Of Circular And Square Ducts Under Laminar Flow And Constant Wall Temperature Conditions
Muhammet Nasif KuruInvariant Algebras in Polynomial Rings
Nazar Şahin ÖğüşlüEvaluation Of The Effects Of Visual And Somatosensory Inputs On Balance in The Elderly By Using Machine Learning
Veysel AlcanMultiplication Rules For Pointwise Inner Automorphisms in Lie Algebras
Ela AydınTheoretical Investigation Of Alternative Fuels Which Can Be Used On Ships
Münir Süner, Buğra Sarper, Servet Uzel, Nedim KizilkayaFekete-Szegő Problem For Two New Subclasses Of Bi-Univalent Functions Defined By Bernoulli Polynomial
Yunus KORKMAZ, İbrahim AKTAŞ**COFFEE BREAK****6. SESSION****HALL-A (Online)-Mathematics****HALL-B (Online)-Mathematics**Chair: **Feride Tuğrul**Chair: **Münir Süner**Fractional Prey-Predator Model With Linear Functional Response, Prey Refuge, Fear And Carry-Over Effect
Ercan BalcıOn Reliability Analysis Of Reference Intervals in Medicine
Gülşen Kiliç

An Almost Unbiased Ridge Estimator in Beta Regression Yasin Asar	On Isolated Subsemigroups of Order-Decreasing Transformation Semigroups Melek Yağci
Investigating Solitary Wave Solutions Of The Benjamin-Ono Equation For Modelling Internal Waves in Deep Water Gülşen Kiliç, Serbay Duran , Birgül Binzet	Relative Controllability Of The μ -Caputo Fractional Delayed System With Impulses Musafa Aydın
	Brief Qualitative Properties Of The Regularized Prabhakar Fractional System Musafa Aydın

11 JULY 2023

. SESSION

HALL-A (ONLINE)-Mathematics

HALL-B (ONLINE)-Engineering

Chair: **Feride Tuğrul**

Chair: **Buğra Sarper**

Generalized Symmetric Bi-Derivations Of Up(Bcc)-Algebras

Damla Yilmaz

The Influence Of The Lactation Period And The Type Of Modified Milk On The Content Of Essential Amino Acids in Human Milk And Infant Formula

Aleksandra Purkiewicz, Kinga Szajkowska, Jacek Nowakowski, Renata Pietrzak-Fiećko

Modeling And Analysis Of Capacitated Nonlinear Network Traffic Assignment Problem

Hasan Dalman

On The Exponential Stability Of Stationary And Perturbed Implicit Systems

Nor El-Houda Beghersa, Mehdi Benabdallah, Mohamed Hariri

A Dynamic Approach To The Effect Of Harvesting

Seval Işık, Figen Kangalgil

Elimination Of Actuation Singularities Of Kinematically Redundant Rpr-Rpr Planar Parallel Robots

Mustafa Özdemir And **Muhammed Yasir Çubuk**

Role Of The Weak Allee Phenomena On A Predator-Prey Model

Figen Kangalgil, **Seval Işık**

INVITED SPEAKER

HALL-A

TOPOLOGICAL INDICES OF FUZZY GRAPH

MADHUMANGAL PAL

Chair: Şehmus Fındık

HALL-B

POSTER ONLINE

Design of Load Lifting Eyebolts and Standardization with Static Tests

Yasin AYGÜL

On A One Type Fractional Sturm-Liouville Problem

Pınar TÜRKMEN

COFFEE BREAK

2. SESSION

HALL-A (ONLINE)-Mathematics

HALL-B (ONLINE)-Engineering

Chair: **Feride Tuğrul**

Chair: **Buğra Sarper**

On Infra Fuzzy-Soft Topological Spaces
Arife Atay

Solving Nonlinear She Equations Using Harris Hawks Optimization Algorithm
Yasin Bektaş

On Leap Zagreb Indices Of A Special Graph Obtained By Semigroups
Yaşar Nacaroğlu

The Necessity Of Using Recycled Waste Aggregate in Turkiye
Eren Yağmur

The Gradient And Partial Derivatives Of Bicomplex Numbers: A Commutative-Quaternion Approach
Ali Atasoy

A Review On Latest Developments in Assembly And Temporary Shelters For Natural Disasters
İrem Karakaya, Alev Taşkin

Comparison Of Predictors/Estimators in General Linear Models With Stochastic Restrictions
Nesrin Güler And **Melek Eriş Büyükkaya**

Carbon Footprint Calculation And Mitigation Strategies For The Transportation Against Climate Change: Pestel Analysis
Şölen Zengin, Fatma Ersoy Duran, Emel Yontar

Numerical Solutions Of Conformable Time-Fractional Klein-Gordon Equation With Proportional Delay By The Novel Method
Halil Anaç

Deciding Applicability Of Blockchain İn Avionics Systems
Ayşenur Sayıl, Harun Çelik

3. SESSION

HALL-A (ONLINE)-Mathematics	HALL-B (ONLINE)-Engineering
Chair: Arif Bal	Chair: Bugra Sarper
Approximation Of Max-Product Truncated Baskakov Operators By Fuzzy Numbers Ecem Acar And Sevilay Kırıcı Serenbay	Process Improvement With Value Flow Mapping Method For Low Density Polyethylene Recycling Processes Emel Can Temiz , Emel Yontar
Geodetic Index Of Graphs Glee Ann L. Tampipi And Rosalio G. Artes Jr.	Investigation Of The Capacity Factor Of The Ege Region Wind Power Plants According To The Real Productions İsrafil Karadöl
Induced Path Polynomials Of The Join And Corona Of Graphs Cerina A. Villarta , Rolito G. Eballe And Rosalio G. Artes Jr.	Comparison Of Reactivity Feedback Coefficients Obtained From Mcnp6.2 And Serpent Monte Carlo Codes Elif Ahsen Baştuğ And Bahram R. Maleki
Statistical Cauchyness With Deferred Cesáro Mean in Asymmetric Context Zeynep Hande Toyganözü	Numerical Investigation Of The Thermal Performance Of A Liquid Cooled Battery Pack Soner Birinci , Mehmet Sağlam, Bugra Sarper, M. Yusuf Yazıcı And Orhan Aydın
Existence Results for Antiperiodic Ψ -Caputo Fractional Differential Equations with p-Laplacian Operator Walid Benhadda , M. El-Omari, A. Kaidi, A. El Mfadel	

LUNCH

4. SESSION

HALL-A (ONLINE)-Mathematics	HALL-B (ONLINE)-Engineering
Chair: Arif Bal	Chair: Münir Süner
Solvability Of A System Of Third-Order Difference Equations Merve Kara, Şule Devicioğlu	Quality Classification of Ceramic SanitaryWare Products with Machine Learning Techiques Sedanur Şimşek , Erdener Özçetin
Properties Of Generalized Semi Closed Sets in The Topology	Computational Aeroacoustic Modeling Of Supersonic Cavity Flows Using Open-Source Flow Solvers

Havva Taşkıran , Ayhan Erciyes	Ramazan Kaba , Melike Nıkılay, Baha Zafer
Some Numerical Approaches For Computing The Hankel Transform Meryem Güney , Zekeriya Ustaoglu	Production Of Sucker Pod And Determination Of Its Mechanical Properties And Localization Of This Product Kürşat Kahya, Bergah Uysal , Gökhan Acıyien
	Detection Of Effect Of Smart Robot Automation On Quality And Efficiency in Production Kürşat Kahya, Seren Geçgel , Seda Yücel

COFFEE BREAK

5. SESSION

HALL-A (ONLINE)-Mathematic	HALL-B (ONLINE)-Engineering
Chair: Gökhan Çuvalcıoğlu	Chair: Münir Süner
Approximate Solutions Of The Integro-Partial Fractional Equation Involving Tempered Ψ -Caputo Fractional Derivative Sami Baroudi , M'hamed Elomari, Ali El Mfidil And Abderrazak Kassidi	Investigation Of The Effect Of Types And Particle Sizes Of Reinforcements On Composite Hardness Of Al6061 Alperen Dindar , Merve Tur, Türker Türkoğlu, Sare Çelik
Totally Umbilical Semi-Invariant Submanifolds Of Poly-Norden Manifolds Şerife Nur Bozdağ	A Performance Analysis Of Attack Individual Pension Funds By A System Dynamics Simulation Approach Muhammed Ordu
Some Fixed Point Applications Of F-Modular Metric Nesrin Manav Tatar, Zehra Dogan , Duran Turkoglu	Ultrasonic Pilot Reactor Design: Temperature, Pressure And Rotary Control Can Be Used in The Production Of Hygroscopic Materials Sinan Köse , Fatma Ulusal, Salih Hakan Yetgin
Open-Loop Control Vs Closed-Loop Control in Smart İrrigation: A Game Theoretical Perspective Ali Hamidoğlu	The Use Of Unmanned Aerial Vehicles in The 3d Documentation Of Historical And Cultural Heritage: The Case Of Ceyhan Kurtkulagi Caravanserai Enis Arslan , Ali İhsan Şekertekin

COFFEE BREAK

6. SESSION

HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Engineering	
Chair: Arif Bal		Chair: Münir Süner	
Preconditioning Linear Systems Using Kronecker Sum Decomposition Youssouf Mezzar		Faults And Suggestions Detected In Distribution Panel And Transformers in Power Plants Hale Bakir	
Nonlinear Differential Equations According To The Bishop Parallel Transport Frame Fatma Bulut		Prediction Of Covid-19 Cases Using Unidirectional Lstm, Bidirectional Lstm, And Deep Neural Network Applications Baha Şen, Büşra Demirbaş	
A Generalization Of The Linear Positive Operators By Using The Special Polynomials Kadir Kanat, Melek Sofyalioglu, Verda Karadaş			

COFFEE BREAK

7. SESSION

HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Mathematics	
Chair: Gökhan Çuvalcıoğlu		Chair: Münir Süner	
Decompositions And Inverses Of Some Lower Triangular Matrices Cahit Köme And Kadir Hilal		Compositions Of Permuting N-Derivations With Commutativity For Associative Rings Mehsin Jabel Atteya	
On A New Class Of Hyperbolic Fibonacci Functions Via Some Special Polynomials Sure Köme And Yasin Yazlik		Some Results On Deferred Cesaro Statistical Convergence Of Order A in The Probability Spaces Uğur Değer, Kübra Uzun	
On Some Natural Geometric Differential Operators Razvan M. Tudoran		Spacelike F-Rectifying Curves in Minkowski Space Hülya Gün Bozok, Önder Korkmaz	
The Selfadjoint Schrödinger Operator On The Half Line With A Real-Valued Compactly Supported Potential Mehmet Ünlü		The Comparison Between Effects Of Heterogeneous And Homogeneous Double Layered Compressible Elastic Media On Dark Solitary Sh Waves Ekin Deliktaş Özdemir	

Contra Continuity For Λ -Strong B-I-Closed Sets Seyfettin Fidan , Aynur Keskin Kaymakci	Approximate Solutions Of Some Fredholm Integral Equations Associated With Lucas Polynomials Çağla Türkoğlu
Almost Supra B-Continuous Functions Fatma Talas , Aynur Keskin Kaymakci	Similarity Measure in Bipolar Fuzzy Sets And its Application To Multi-Attribute Decision Making Method Gözde Sevil Zariife Zararsiz

CLOSING CEREMONY
Chair: Gökhan Çuvalcıoğlu